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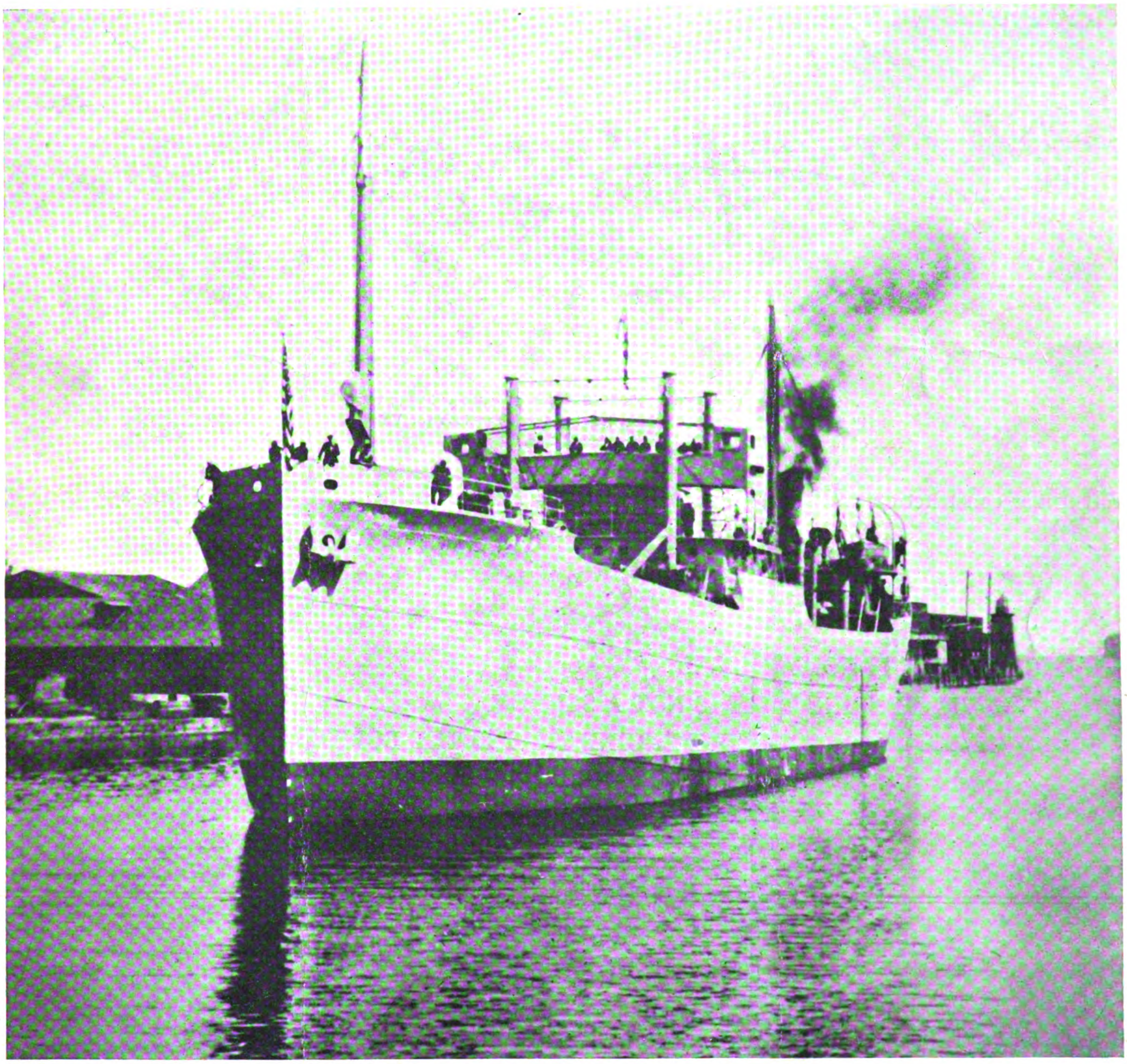
# MOTORSHIP

(Trade Mark Registered U. S. Patent Office.)


*Devoted to Commercial and Naval Motor Vessels*

Vol. 2 NOVEMBER, 1917 No. 11
SEATTLE NEW YORK



MOTORSHIP "ADA"—THE UNITED STATES SHIPPING BOARD'S FIRST MOTORSHIP

Published on the Twenty-fifth of the Month

# MOTORSHIP

United States and Mexico, Per Year $3.00
Foreign Countries $3.50
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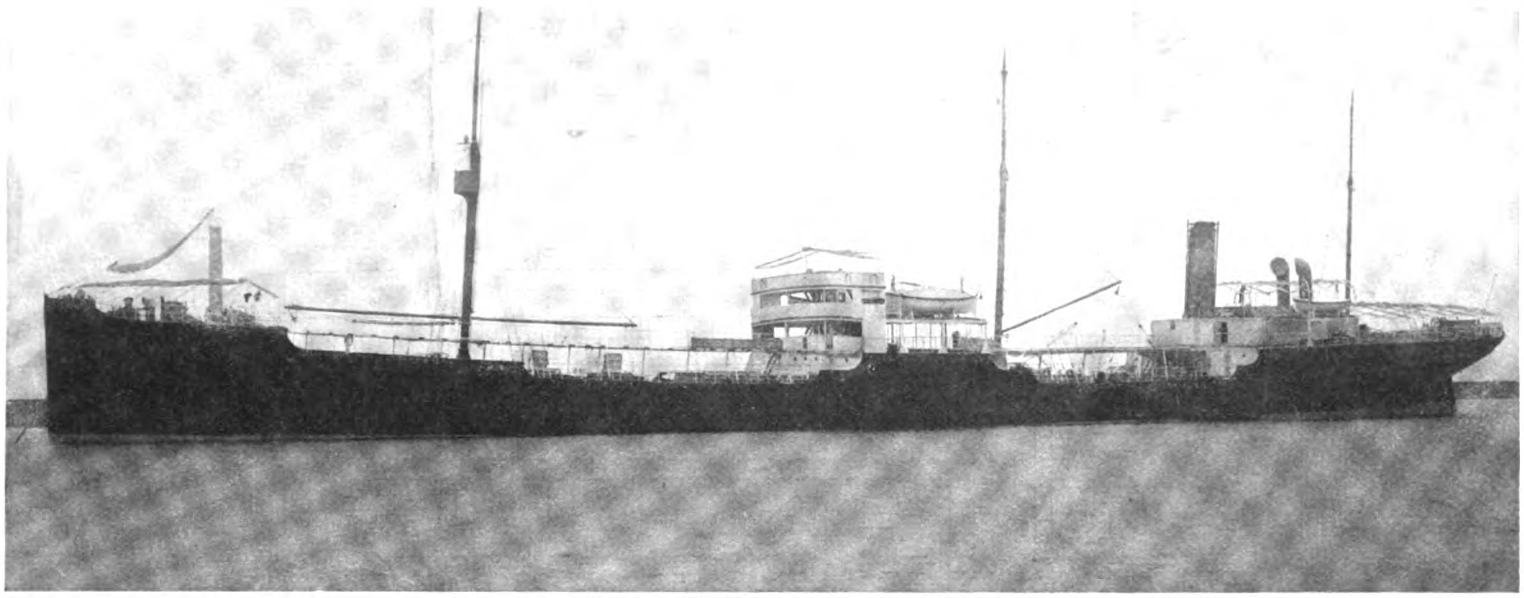
Vol. 2 SEATTLE, U. S. A., NOVEMBER, 1917 No. 11

# The Working of an Early Motorship

## Unusually Interesting Details of the Difficulties That Arose During Five Years Operation, Illustrating the Great Value of Practical Experience Under Sea-Going Conditions

(Written for Motorship)



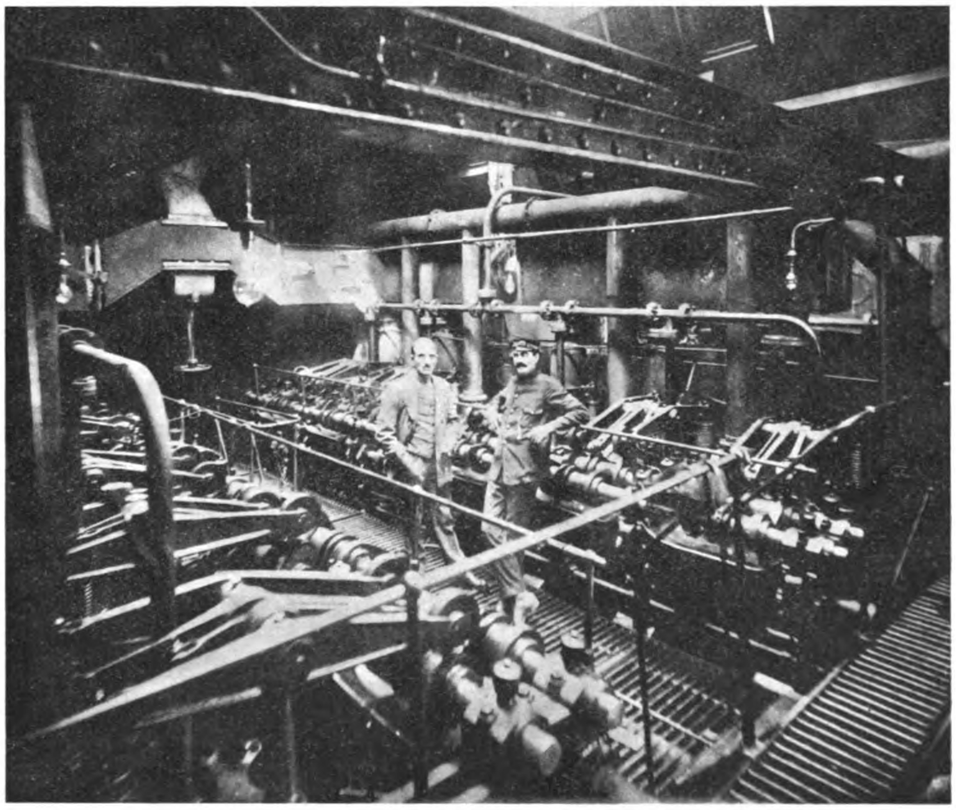
THE VETERAN MOTORSHIP "EMANUEL NOBEL"

UP to the time of her latest visit to New York the Diesel-driven motorship "Emanuel Nobel" had made no fewer than 22 trans-Atlantic round-voyages, each averaging about 8,000 nautical miles, so related her chief engineer, Mr. Prudent Constant Vansteene, to a representative of "Motorship" recently. She also made a voyage to the Black Sea prior to the outbreak of war. Hence this ship has a record of approximately 180,000 nautical-miles to her credit, since December, 1912, when she was completed, which under the particular circumstances is no mean record.

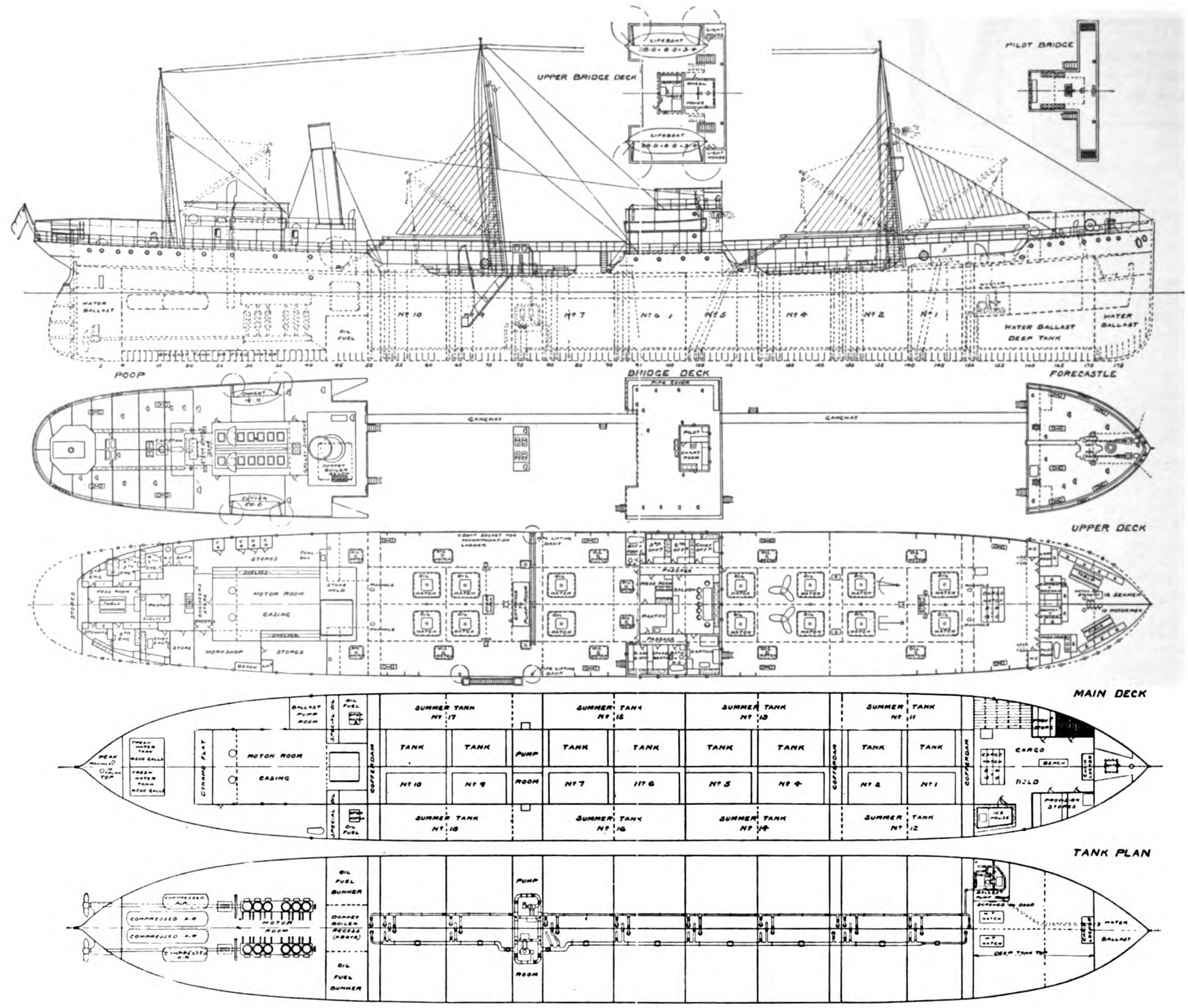
The "Emanuel Nobel," was the first large twin-screw Diesel ship engined by the company who built her motors, so was more or less an experiment, and naturally she was beset with some of the trials and tribulations of many other early motor-ships, instant perfection not being anticipated. Consequently her operation has formed most valuable experience for the builders of her engines, and no doubt they would acknowledge the same to be well worth the cost of such changes that naturally had to be made from time to time; for, an absolutely reliable ship,—whether Diesel or steam-driven,—can only be produced by actual experience, and preseverence; and, experience in any shape or form is costly. That, all of us find in our daily lives! Steam-engine design is a simple matter now-a-days, because designers and builders have all the necessary data; but, it is only during the last few years that marine-engine builders have been enabled to accumulate sufficient data to enable them to produce absolutely reliable marine Diesel engines of high power. Praise is due to many of them for their undaunted and persistent efforts in the face of terrific obstacles, opposition and ridicule.

One outstanding feature of the "Emanuel Nobel" is that she is doing her work—perhaps not as well as newer ships, but her running is improving every voyage. During the coming winter it is hoped that enough time can be spared to make some further changes and thus bring her more in line with present-day practices of the builders of her engines. Then her chief-engineer believes that all his worries will be entirely a matter of the past. As it is, her engines still incorporate features that were abandoned several years ago by her builders.

Let us remember that several of the motorships built by some of the other great European engineers since the advent of this vessel, have long since had their old Diesel engines placed on the scrap-heap, while the "Emanuel Nobel" today is maintaining a fairly regular trans-Atlantic service, even if she occasionally has to be held up in port a week or ten days. This would indicate that, fundamentally, the design and principle of her engines originally were correct, but that certain mechanical features did not quite come up to the full requirements of the strenuous work of mercantile marine service, and that it needed con-



ENGINE ROOM OF THE "EMANUEL NOBEL"
On the Right is Chief Engineer P. C. Vansteene, and on the Left is Camille Bouckart, Second Engineer




PROFILE AND PLANS OF THE "EMANUEL NOBEL"

siderable ocean-going experience with Diesel engines in order to ascertain with any degree of certainty what actually were these features. Also, that without these valuable experiences it hardly is possible to attain present day perfection of the same design of big marine Diesel engine.

To put it plainly, "her past troubles have been a blessing in disguise." This vessel furnished for the builders just that amount of knowledge which fifty years of marine steam engineering construction and twelve previous years of stationary Diesel-engine building did not supply. What the operation of the "Emanuel Nobel" revealed they were able to incorporate into later designs, and thus produce perfectly reliable vessels that actually have needed less repairs than the average ocean-going freight or tank steamer, and certainly more reliable than some of the most modern geared-turbine cargo ships.

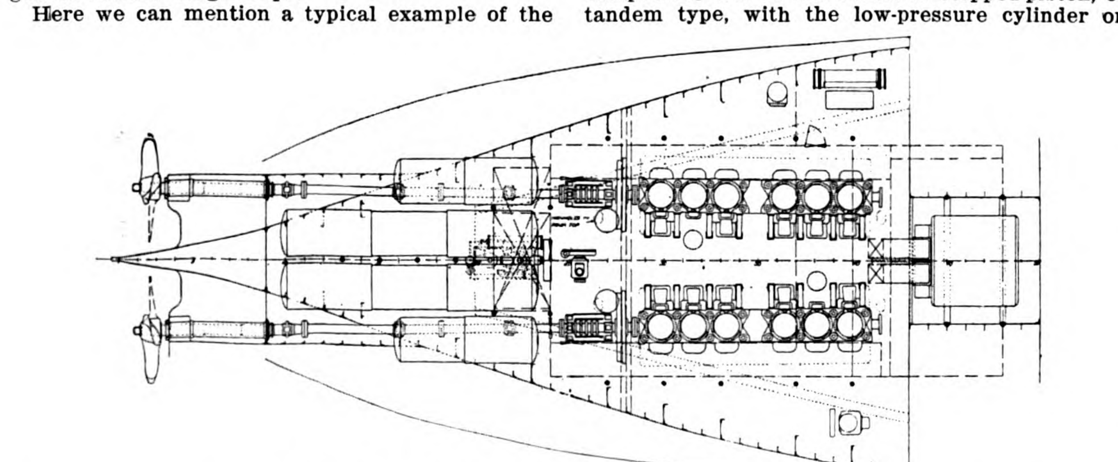
Here we can mention a typical example of the great benefits to be derived from experience, and how it took several years operation of this ship before the particular weakness in the design was revealed. It was a mishap that may not have happened once in ten years, or on the other hand was likely to frequently have occurred with any ship. The makers afterwards were enabled to make a similar occurrence almost impossible on all later-built ships, and so the trouble is absolutely a matter of past history in their case, although, of course, such a radical change in the design was not made to the "Emanuel Nobel's" engines.

It was the air-compressor on one of the two main engines. This is driven in an orthodox manner by link and beam motion off the cross-head—a practice very successful and recognized as being excellent engineering and which practice the builders of these engines still retain. The compressor was of the orthodox stepped-piston, or tandem type, with the low-pressure cylinder on top, the intermediate cylinder below it and the high-pressure cylinder below that again. The latter two pistons were in a one-piece casting.

The H. P. cylinder consequently projected down below the floor of the engine-room, where it was rather difficult for the engineer or oiler, on watch to regularly feel, consequently one can understand that this may not have been attended to as regularly as advisable, particularly as the high-stage must not receive more than a minute quantity of lubricating oil.

One day the H. P. piston got hot and seized in its cylinder. Both the intermediate and H. P. cylinders and pistons were broken, and driven across the platform, bending and breaking the steel air and water pipe connection, also the crossheads were slightly bent and the driving-links elongated, for, the oiler standing by, instead of promptly stopping the engine, (which can be done instantly by pulling over the lever controlling the fuel supply) bolted on deck. It took the ship's engineers 40 hours work at sea to get everything in proper shape, meanwhile the ship proceeded on one engine.

When the builders of the engines heard of this occurrence, they immediately set about changing the design so as to obviate any cause for slackness on the part of the men in charge and to prevent a re-occurrence of this. And, with all engines built subsequent to this mishap they fitted the new design, which has not even given a suggestion of trouble. The link and beam operation motion is still retained as this has proved efficient with all their ships. But, the high and intermediate stages of the compressor are arranged side by side, each having its own cylinder and piston-rod, while the first stage is directly below, and has its own piston-rod, thus every piston can be separately dismounted. Furthermore, every cylinder is in a position level with the oiler's hands, so that he easily can feel them as he passes by, and should there be a sign



MACHINERY ARRANGEMENTS OF THE "EMANUEL NOBEL"

It will be seen that her auxiliary steam engines, pumps, take up as much room as the big main Diesel engine.

of excessive temperature, the cause can be ascertained at once and remedied before any harm is done. The high-stage has a simple liner that can be removed if scored. In actual practice the new arrangement has even exceeded all expectations.

The incalculable benefit of experience also was found in connection with the cylinder heads of this ship. When her engines were designed the builders decided to follow recognized practice, and arranged the fuel injection-valve in the center of the head. Because of the room taken by the other valves, this left only about three-quarters-of-an-inch space between it and the exhaust-valve, where the heat is greatest. Under ordinary circumstances and with fresh-water-cooling this is quite alright; but under sea-going conditions, and in entering and proceeding out of the dirty water of harbors, this space occasionally became choked with deposit, and prevented proper cooling.

In the case of these engines it sometimes was found that the back part of the cylinder head was hot, while the front part was cold, and the water being unable to get from one side to the other would lay stagnant. Of course, no metal can stand the strain long, and so some of her cylinders at different times have cracked. This experience taught the builders that it was not always wise to follow orthodox practice. The cracks, however, do not prevent the engine working until the cylinders can be replaced.

With the later models the fuel injection-valve is off-set from the center, and now there is at least four inches of cooling water space, everywhere in the cylinder head. Off-setting the fuel-valve is in contradiction to all theories but is proving perfectly alright in actual practice. With this new design of cylinder not a single crack has resulted with any ship, proving that the trouble has been overcome for an absolute certainty. The "Emmanuel Nobel" now has all the new type cylinders, with one exception, for which she awaits delivery from the works. This, of course, is a typical demonstration of the value and necessity of experience. There are no covers with their attendant flanges, so that the cooling is effectual.

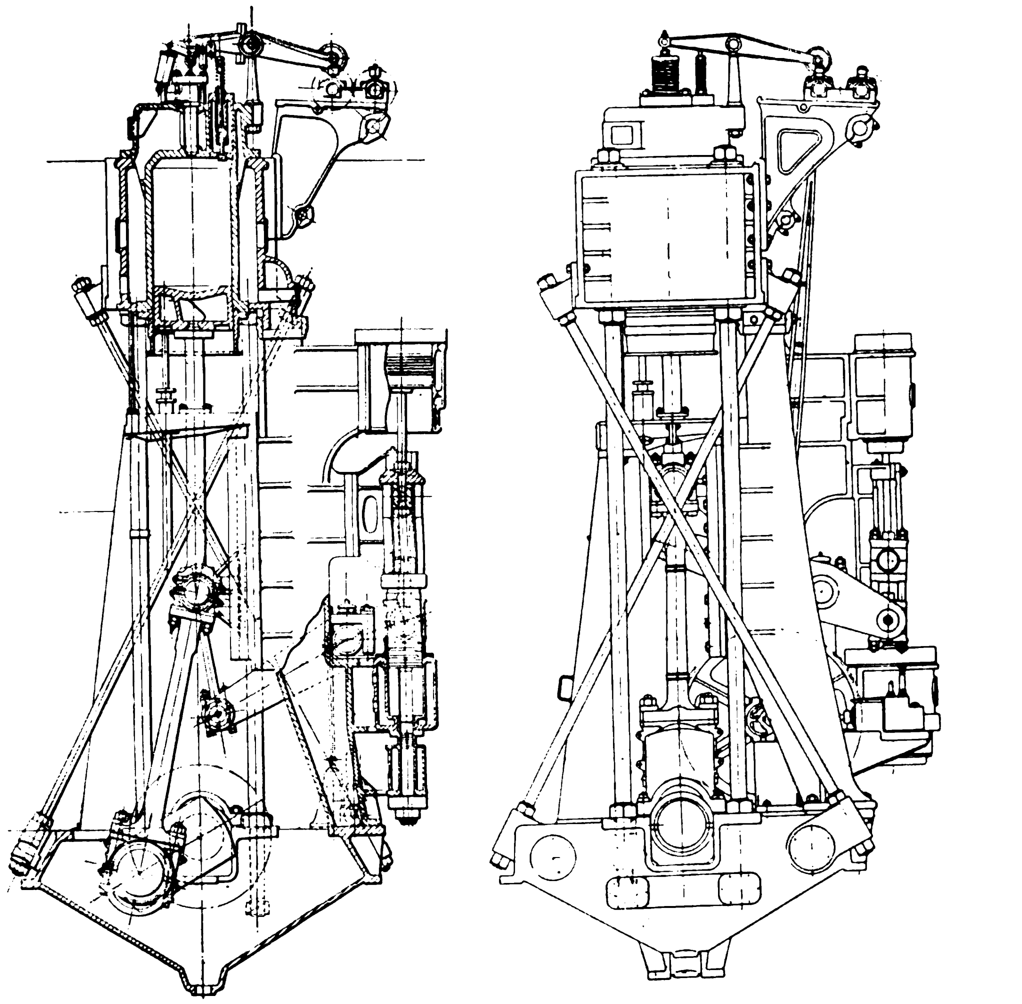
In the early days of this ship the engineer question was a much harder problem to solve than is the engineer situation today, because when she was placed in service, the number of qualified ocean-going Diesel engineers almost could be counted on the fingers of one hand, and steam engineers had to use their own wits in operating the strange machinery, having had no one to properly guide and assist them. Consequently they virtually had to obtain their operating knowledge at the expense of the Diesel engines. As they became more and more used to the little peculiarities of the Diesel engines, the running of the engines became better and better. This is a reason why Diesel engines should closely follow steam design.

The present chief engineer of the "Emanuel Nobel" temporarily was made first engineer when the steamer he was on was sunk by Germans; and, although he was without previous Diesel experience, it was not long before he knew sufficient to take his rightful position as chief engineer.

Being a tank-ship, the "Emanuel Nobel's" engines are installed aft, where the ship is fine-lined, and because of the very small amount of space allowed for the engine-room, it looks as if her two big Diesel motors were assisted in position by a shoe-horn when they were installed, yet the engines are only 27' 3" long. Because of the engine-room congestion the operating of her engines sometimes is not at all pleasant, and were it not for the remarkable accessibility of her engines her engineers would not be at all happy.

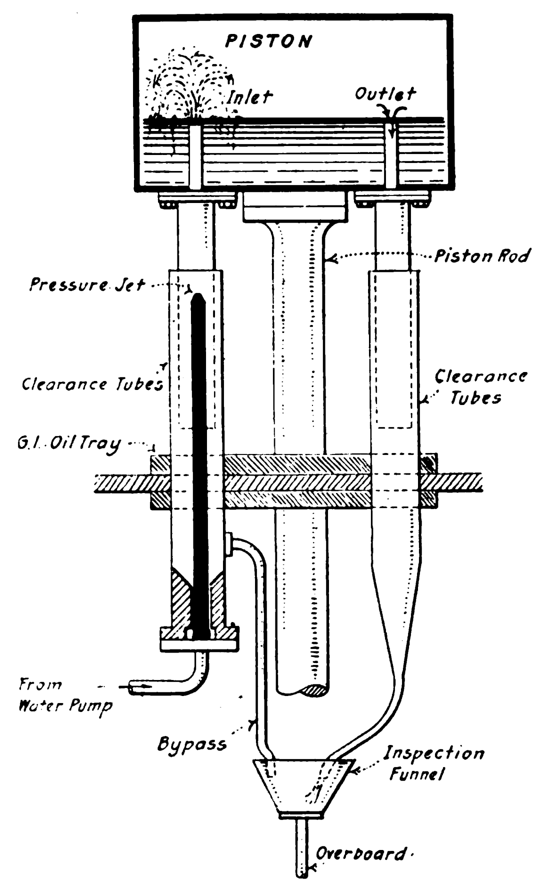
But, owing to the ease with which her staff can get at or overhaul any part of main engines, their duties are very considerably facilitated and their work lightened. The engine-room photograph will give an excellent impression of what we mean. Had more room been given to the main engines, and had most of the steam-auxiliaries been installed in a separate compartment we think it would have made a vast difference.

While Motorship's representative was aboard the steam auxiliary-engine was running, and the racket and thumping was most uncomfortable, the noise being much greater than that caused by the main engines when they are running, so the stopping of this steam set was quite a relief to his feelings. The exhaust gases from the main engines give the donkey-boiler when at sea, 100-120 lbs. pressure. The deck-boiler is oil fired at 180 lbs. pressure.



On the left is shown the compressor arrangement of the "Emanuel Nobel's" engines. On the right is depicted the arrangement as adopted in later engines as the result of experience. The change does not appear very significant, but nevertheless has proved vitally important. The reason is made clear in the article. The drawing on the left also shows the old stuffing-box piston-cooling system, which was discarded.

The general arrangements of the steam auxiliaries and of the piping are not at all in accordance with modern motorship practice, and an




Schematic Sketch of the New Piston-Cooling Arrangements of the "Emanuel Nobel's" Engines

entire re-arrangement of the piping, etc., would make a vast improvement. At the time the "Emanuel Nobel" was built there was not sufficient data available to allow the builders to form an accurate conclusion as to the best arrangement for the piping, etc. The chief engineer is anxious to have an auxiliary Diesel engine of about 120-150 b. h. p. installed, which probably will be done later on. Then the present auxiliary steam-driven compressor will only be used in case of accident or emergency, and the work of the engineers in consequence will be lessened.

Before continuing further it will be best to give a few details of the dimensions of the "Emanuel Nobel." They are as follows:

Owners—Societe Anonyme d' Arment d'Industrie et de Commerce, of Antwerp and London.
Operators and Agents—The Sun Company, Philadelphia, Pa., U. S. A.
Builders of Hull—Netherlands Shipbuilding Co., Amsterdam.
Builders of Diesel Engines—Netherlands Engineering Works (Werkspoor), Amsterdam.
When Completed—Dec., 1912.
Displacement (Loaded)—9,000 tons.
Cargo Capacity—2,000,000 gallons of crude oil.
Fuel, Stores, Water, Drinking Water, etc., carried—520 tons to 670 tons.
Length of Ship Over All—390 ft. 6 in.
Length of Ship, B. P.—375 ft.
Breadth—51 ft.
Molded Depth—29 ft.
Draught (Loaded)—25 ft. 5½ in.
Engines—Twin four-cycle type, six-cylinder sets, 22 in. bore by 39⅜ in. stroke.
Indicated H. P. at Sea (Normal)—2,650 I. H. P. at 105 R. P. M.
Fuel Consumption at 11 Knots (Total)—9 tons (summer), 9½ tons (winter).
(On her last voyage a total of 4,303 nautical miles were logged on a consumption of 199 tons (1,393 barrels), the engines averaging 90-3 R. P. M.)
Engine Room Crew—12 men.
Starting-air Pressure—250 lbs.

As will be seen by the engine revolutions, the present chief engineer is not working the motors so hard as previously, and the consumption is brought down to about 8½ tons per 24 hour day. The previous time we went aboard this ship, however, she had done the voyage from Rouen to Philadelphia in 14 days, the engines turning at 105 r. p. m. This is pretty good going! The lubricating-oil consumption is moderate for an open-type Diesel engine of this power, and for a round trans-Atlantic voyage she takes 30 barrels aboard. The same oil is used for the cylinders as for the bearings.

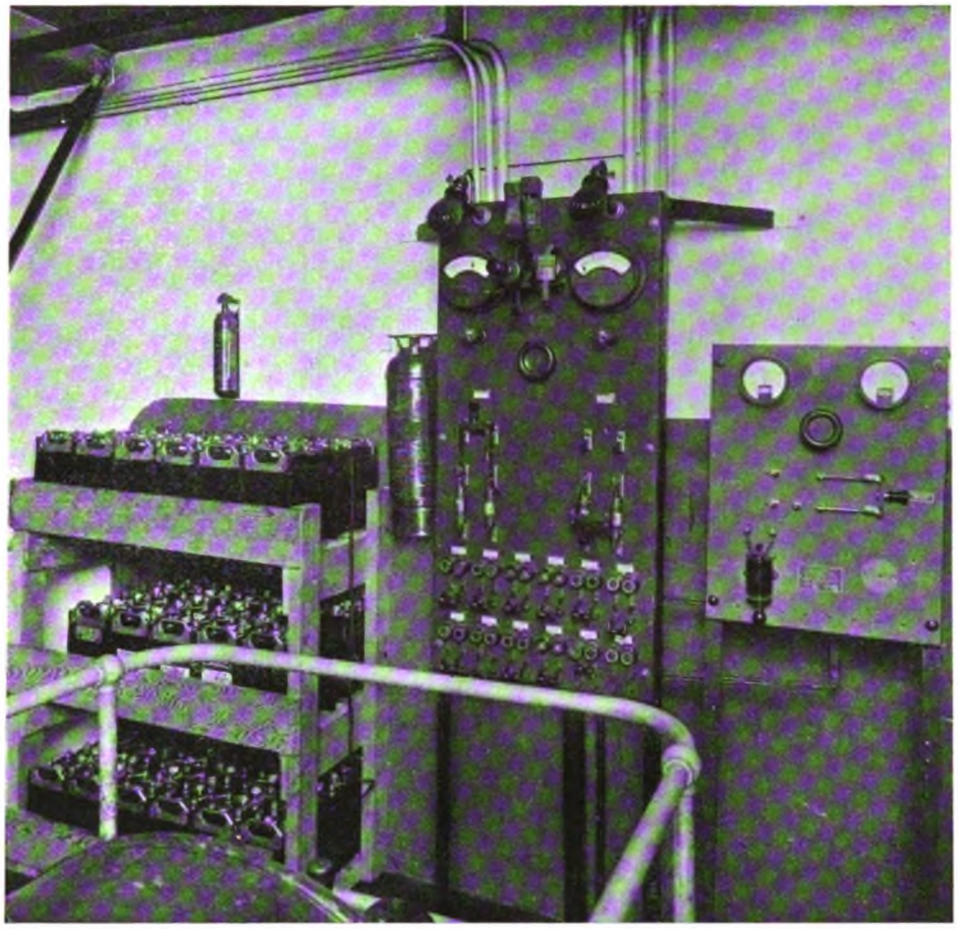
On this ship the great benefit of the cast-iron oil trays fitted below the cylinders is to be seen. This collects the carbonized lubricating-oil that drops down from the cylinders by the scraping action of the piston rings. In the case of a ship equipped with motors of different make, all this sticky carbon falls into the crank-housing and forms thick clusters on the walls. As this carbon falls in the form of very hard

# Edison Storage Battery Equipment for Motorships

## Auxiliary Marine Lighting

THE one use to which the Edison storage battery has been placed of late which is fast becoming popular with shipowners, is that of marine auxiliary lighting. Motorship is particularly interested in this phase because of the great number of installations which have been made and also of the number that are being installed. Recent motorships to have this equipment aboard are the "Tacoma," "Portland," "H. C. Hansen" and the "Remittent." Elsewhere in this issue appears an article on the Motorship "Remittent" to which we would direct the attention of the reader as it brings out many advantages of a storage battery installation.

The Edison battery is a product of eight years of study and experimentation in the laboratories of Thos. A. Edison. When it was perfected it was placed on the market. That was eight years ago. Today it has demonstrated that it is practical, economical, and able to stand up for many years with a minimum of maintenance cost and depreciation. The value of this battery has been proven in a great variety of fields, and is now used for a great number of purposes.



LIGHTING EQUIPMENT OF M. A. "REMITTENT"

Showing Main and Charging Switchboards and Edison Storage Battery

An Edison storage battery requires very little care and attention to keep it in first class condition; all that is necessary is to properly water the cells every few weeks and keep them reasonably clean from dirt and moisture and about every two years if in marine service to renew the solution in the cells. In marine work it is not always possible to keep a storage battery fully charged and for this reason the Edison is ideal in that no harm can come to the cells even though they are left indefinitely in any state of charge or even completely discharged. .It is also possible to charge an Edison at high rates of current for short periods of time.

A storage battery is practically a necessity on any class of ship either for lighting or for wireless as it always supplies a source of electrical power in case of emergency and allows means for light without having to run the engine constantly.

Each individual cell of the Edison battery, regardless of size and capacity embodies the same characteristics. The positive plates of each cell are made up of small perforated steel tubes containing nickel hydrate as an active material; in a B-type cell which is the type used in marine installations, the positive plates contain fifteen tubes. The negative plates are composed of perforated steel pockets containing iron oxide as the active material and in the B-type cells, sixteen pockets are used in each plate. With the exception of the active materials in an Edison storage battery, steel is used throughout and hard rubber is used to insulate between the plates and the inside of the containing can; the steel insures rigid construction and protects the cell when severe vibration is encountered such as in industrial trucks and tractors.

After the plates have been assembled on their respective pole groups they are placed in a steel container and the cover of the cell is then welded on by the oxy-aceteylene method. In every day service where a minimum of care and attention are provided there are very few cases where it is necessary to send a cell in for repairs and for this reason the covers are welded on.

Individual cells are assembled in strong wooden trays, each cell being insulated from the tray with hard rubber buttons and are made up in various sizes to fit different installations. For connecting together in the trays heavy nickel plated copper wire is used and this is swedged into steel lugs, taper fitted, to fit the tapered terminal poles of the cells. To disconnect batteries is a very simple matter, all that is necessary is to remove the pole nuts and apply a special jack to the connector.

In the article on the "Remittent" more details are given regarding these batteries.

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dust, the advantage of collecting it easily is appreciated. Only, in the case of the "Emanuel Nobel" the trays are not large enough. Oil mixes with it, and it gets carried all over the engine-room floors, rails, etc., in the form of a sticky black paste, making a very dirty engine-room. However, it is better to have this carbon on the walls of the engine-room, than in the bearings, even at the expense of a dirty engine-room, although the latter can be avoided, as it is not a fundamental feature.

A similar sized steamship having oil-fired boilers would carry at least 17 men, in the engine-room and stokehold, compared with 12 men aboard the "Emanuel Nobel." They are chief, second, third, and fourth engineers, three assistants, three greasers, and two cleaners, respectively.

Regarding the air-starting arrangements, it is interesting to note there are relief-valves fitted to the cylinders to reduce the compression internally; furthermore, there is a sleeve fitted to each air-inlet pipe, so that the inlet can be closed and no atmospheric air admitted to the cylinders until the engine gets under motion. This sleeve is interlocked with the control gear. Thus these big engines can be started on a pressure of 250 lbs. per square inch, which means great economy of compressed-air, a very important point too often overlooked. The air-starting valve cam has a double "lift," one to allow of the valve being slightly opened, such as when the engine is hot, and does not require much air to get away under load. The larger "lift" can be brought into action should the engine be cold and refuse to pick up the load with a small quantity of air. To prevent sticking of the fuel-valve there is a little automatic device, which closes it, should it happen to remain open by any chance.

With early motorships piston-cooling with sea-water presented a most important problem, because of the effect of saline when it gets into the lubricating-oil. Oil cooling can only be used with reasonable safety where open trunk-pistons are adopted, its use with box-type pistons being considered dangerous, also it is very uneconomical. Using fresh-water meant large fresh-water tanks. Air-cooling should be restricted to pistons under 16" diam. So the advantages of using sea-water make themselves apparent. With sea-water below 100 degrees Fahr. practically no scale is deposited. When it is below 70 degrees Fahr. it is as good as fresh water. But over 100 degrees Fahr. scale will deposit if the flow is not good. Hence, it will be understood that the design of pistons (and the cylinders too) must allow of no pockets, particularly if the ship trades in tropical waters. Once scale starts to deposit it quickly forms, and so causes local temperatures, perhaps at important points.

In the original design of salt water-cooling for the "Emanuel Nobel's" pistons, telescopic-pipes of steel were fastened to the bottom of the pistons, these working into a larger sized outer-pipe through stuffing-boxes. These steel pipes corroded very quickly with the action of the sea-water and it was found impossible to keep the glands tight and avoid leakage. They were replaced by pipes of brass and pipes of copper, which worked fairly well and did not corrode, but these broke off at the neck frequently. This fracturing was due to the fact that while the pipes could be set quite straight by the fitters when erecting the engines in the shops, it was not so easy in the ship, when the engineers had removed the pistons for inspection purposes or for cleaning the rings. Consequently these pipes when replaced would be out-of-line with their glands, and the unequal frictional side-pressure quickly broke them at the neck, or else wore away at the stuffing-boxes causing bad leakages of salt water, which got down into the oil.

Finally, the builders discarded them and installed the present simple system, which is patented, and which consists of a jet of sea-water forced up under pressure through clearance tubes having no rubbing parts; but simply moving up and down with the piston to prevent splashing. There is about ½" clearance. The piston is rarely more than about half full of water, the broken surface of the water being far better for the cooling than a solid mass. By a simple sight outlet and by-pass system, a chokage of water supply can instantly be detected, and located exactly by the assistant on watch.

Furthermore, should there be a stoppage of the water supply, the pistons contain enough water to keep the pistons cool for quite a little while, giving the operators-in-charge more than ample time to notice the same and stop the engine before any cracks occur to the pistons. As the outlets and by-passes are right before their eyes on the front of the engine, they cannot fail to instantly notice any discontinuation of the supply.

These arrangements like many others described are the results of experiences under sea-going conditions. Six and seven years of such experiences, however, have given many of the Diesel engine builders more than efficient knowledge to put "almost fool-proof" motors in trans-Atlantic ships, the accumulation of such knowledge having been of untold value to them. Vessels that operate month after month with less trouble than met with in the average steamship are now in regular ocean service, giving more than the duties that the owners expect of them.

# The Arrival of the Motorship

## Public Statements by Prominent American Shipping Men

**The Clyde & Mallory Lines** (Mr. H. H. Raymond): "The motor-driven ship is as inevitable as the automobile was. It has to come and there's no stopping it. My steamship lines undoubtedly will take up the motor-driven vessel in course of time. We would have made great strides in motorship construction had not death taken from us our M. W. C. Selden, a brilliant engineer much interested in the marine oil-engine. The time will come when we will see a standardized motor-driven ship that will represent the most practical type of ocean carrier.

**The Southern Pacific Steamship Lines** (a High Official): "I expect to live to see the day when this type of vessel will supplant the steamer as an ocean carrier, and the next two years will see great strides in the perfecting of the internal-combustion engine. Notwithstanding the numberless drawbacks due to the war, the future of the Diesel-driven vessel is absolutely assured. We have to work the problem out, and will probably have some disheartening and costly experiences. The Southern Pacific Co., at one time contemplated installing a Diesel engine; but, circumstances erected by the war caused the postponement of this plan. We undoubtedly will take up the motorship question again when normal times return."

**Wm. Denman** (late chairman U. S. Shipping Board).—"The Shipping Board under my chairmanship planned building a Diesel motor-driven fleet that would give us a dominance in maritime carriage after the war, and would render America independent of Great Britain's world-wide coaling stations."

**Gulf Refining Co.** (Mr. James Kennedy).—"The Gulf Refining Co. is a great believer in the future of the Diesel engine, and engine builders in this country should lose no time. A dependable engine would, I'm sure, receive the support of American shipping men. This company intended to have a motorship built by Werkspoor, but the outbreak of war interfered."

**American-Hawaiian Steamship Co.** (Mr. Bernard Mills).—The oil-propelled motor is the power of the future, and there is no question as to the superiority of the motor to the steam engine for ships up to about 15,000 tons. If the American government and shipowners here generally do not get in step with progress, we will, of course, be hopelessly outdistanced. At the outbreak of war our line was considering the project of installing motors in many of our ships, but we have not been able to make a start. After the war we will take up the question of making the changes. There is no great obstruction in the way of either building or operating the Diesel motors. The fact that such well-managed companies as the Royal Dutch Shell are adopting the Diesel motor should be enough to make American ship-owners pause to investigate at least. It is only a question of a short time for operating engineers to develop the necessary expertness to handle the Diesel engine."

**Standard Oil Co. of N. J.** (Mr. F. D. Asche).—"We do not feel that we have been able to give the motorship a fair trial. Our experience has been costly, but it has not shaken our faith in the matter of motor propulsion for sea-going vessels. What we have done proves beyond question that we believe in this means of propulsion."

**Mr. Theodore Ferris.**—"I have inspected foreign-built Diesel-driven motorships and there is no doubt in my mind that they represent the most economical and generally desirable type of merchantman. But I do not think, with all its desirable features, that the motorship will ever displace the steamer as an overseas carrier. For the next eight or ten years, at the very least, the thought and energies of American builders will be devoted to developing the steam turbine."

[Mr. Ferris is naval-architect to the Clyde and Mallory Steamship Lines and evidently his opinion—which indicates very little foresight or true realization of conditions—is in direct contrast to the opinions of M. H. H. Raymond, Mr. C. Mallory, and Mr. W. D. Webster, who are the president, vice-president, and superintendent-engineer, respectively, of the Clide and Mallory Lines.—Editor.]

**Mr. W. Pierce Benson.**—"Every day wasted by the United States in the development of the Diesel engine adds a day to the length of time that the American merchant marine must remain at the mercy of foreign countries. Oil is the sea fuel and the Diesel engine is the motive power of the future for all maritime nations of the earth; but, its adoption means more to the United States than to any other country in the world. Shortly after the conclusion of the war I expect to see the Norwegian flag flying over the greatest motorship fleet in the world. I recently have been in Holland and in Scandinavian countries where they have seen the light. If the United States takes the motorship seriously and develops it with energy and farsightedness, it will mean for her a place on the high seas, that she could never have hoped to attain with the coal-burning steamer."

# Motor Lifeboats for U. S. Coast Guard Service

**MOTOR LIFEBOAT**
**Built by Camden Anchor-Rockland Machine Co., Camden, Maine**

Four motor lifeboats for the U. S. Coast Guard service were launched recently by the Camden Anchor-Rockland Machine Co., of Camden, Maine, and two more will have been launched by the time this appears in print. The first two, one of which we illustrate, have been delivered to the New York Station, having made the run from the builders' yard under their own power. In each the power plant consists of a 40 h. p. Sterling gasoline engine of the electric-ignition type, with electric and hand starting equipment. Each boat is 36′ long by 8′ 8″ beam, and the machinery is installed in a water-tight compartment at the after end of the hull.

Lifeboats similar to these have been used by the U. S. Coast Guard for many years and are well known along the U. S. coasts. The old style boats were fitted with center-boards, while in the new type of boat, this centerboard is omitted, and the necessary changes made in the design and construction to do away with the centerboard. The cockpit deck is above the water line, is water-tight and is fitted with ten self-bailing copper tubes, tin lined. All the available space under the cockpit deck, and all available space under side seats in cockpit, as well as the space under the floor in the forward end box is filled with air cases, made of clear white pine, covered with canvas, laid in glue and painted several coats.

The boats are so planned that when placed bottom up they will right themselves and at the same time bail themselves out. The builders were obliged on their contract to put one of the boats through such a test. It was a success; the boat righted herself in three seconds, bailed herself out in fourteen seconds.

The material used in the construction of these boats is the very best to be had. Planking throughout, Port Orford cedar, frames clear white oak, fastenings copper and composition. General interior construction, mahogany. The boats are planked diagonally; two courses of planking being used. Before applying the second course of planking, the first course was covered with canvas one piece, laid in glue, which, considering its weight, is the most rigid construction obtainable. These boats are fitted with two masts and three sails, also fitted to take eight oars, and will easily accommodate fifty persons, if the occasion ever requires it. Under power the boats show a speed of a little better than eight knots, which, considering the size of the power plant and the heavy construction, is remarkably good.

# New American Full-Powered Diesel-Driven Ship

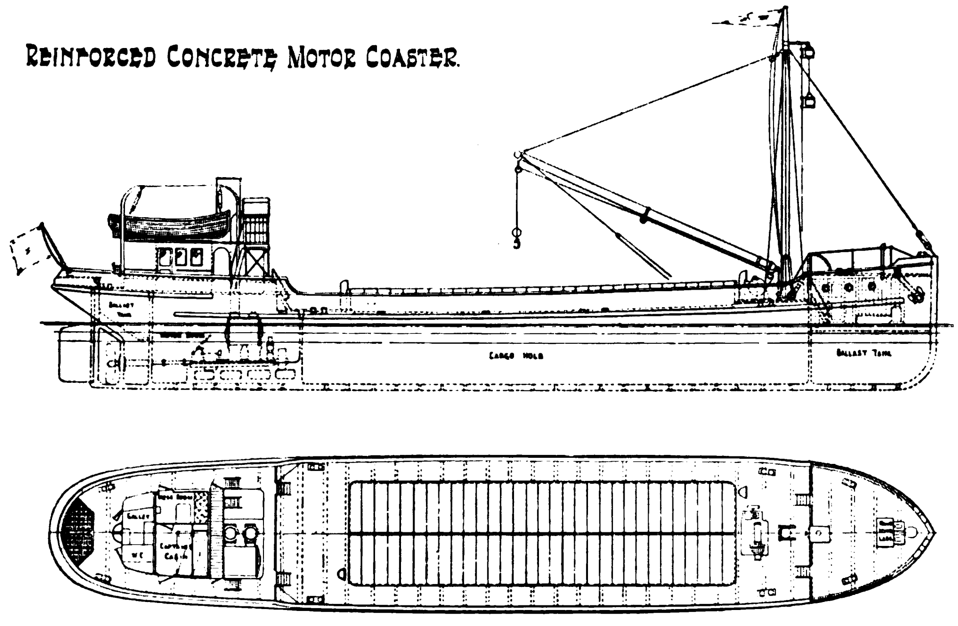
Owing to the supply of marine-oil, and steam, engines being less than the demand—shipowners are apt to take steps that they would not consider in more normal times, consequently several merchant crafts are being installed with motors of high-speed and moderately high-speed types. However, it is unwise to jeopardize the future of the motorship industry by installing engines of too light weight and of too high revolutions to stand up to the severe work of propelling heavy sea-going ships.

Consequently many will watch with interest the operation of the wooden full-powered Diesel motorship "Edith Nute," owned by the Atlantic Maritime company of Boston, Mass., which recently was launched from the L L. Snow & Co. yard at Rockland, Maine. This vessel when laid down was intended as a sailing-ship for the African trade, but was altered during construction, so that she presents an unusual appearance.

The "Edith Nute," which is an American built and engined vessel, has a carrying capacity of 1,300 tons and a gross tonnage of 1,000 tons and is of wooden construction. Her dimensions are, length of keel 175 feet, length over all, 218 feet, beam 37 feet, depth of hold 16½ feet. She has a mixed wood frame and is planked and ceiled in hard pine oak and Oregon fir.

Her propelling power consists of two four-cycle type Diesel-engines of the moderately high-speed class, without crossheads and guides, and aggregating 480 b. h. p. There also are two small auxiliary motors. The fuel-oil tanks have a capacity of about 178 tons, which is said to be sufficient for a radius of 10,000 miles.

The arrangement of the houses gives the vessel its peculiar appearance. The forward house extends 45 feet backward from the knighthead. Aft of it are four tanks, each having a capacity of 6000 gallons of fuel-oil. These tanks are decked over to accommodate a midship house 30′x19′. Above that is a bridge deck extending from rail to rail, and surmounting that is the pilot house containing the captain's quarters. The after house extends forward from the taffrail 35 feet, and in addition to furnishing quarters for the engineers' force, contains two tanks with a capacity of 7,000 gallons each. In a later issue Motorship hopes to publish an illustration of this quaint motorship.




THE 92-FOOT REINFORCED MOTOR COASTING-VESSEL THAT IS BEING BUILT IN ENGLAND BY JAMES POLLOCK & CO., LTD., OF LONDON, AND BEING EQUIPPED WITH A 120 H. P. BOLINDER OIL-ENGINE. THIS SHIP WAS RECENTLY MENTIONED IN MOTORSHIP

## GERMANY AND HER U-BOATS.

It was fourteen years ago August 30th that the Krupp Company launched the first German submarine, namely the U-1, after which date she made very rapid strides, the annual appropriations showing that her naval advisers appreciated the value of this type of craft. In a way it is unfortunate that Germany spent such large sums of money on submarines, because the purpose to which she has put her U-boats has gained for her the disgust and contempt of the entire world. Her submarine appropriations to the outbreak of war, are as follows:

| | |
|---|---|
| 1907 | $1,250,000.00 |
| 1908 | 1,950,000.00 |
| 1909 | 2,500,000,00 |
| 1910–11–12 | 7,250,000.00 |
| 1913–14 | 9,750,000.00 |
| Total | $22,700,000.00 |

As to what Germany has spent on submarines since the war probably never will be known outside of Germany. That Germany's present policy of sinking merchant ships was premediated is evident from a public statement in connection with the naval budget of many years ago.

"We shall build submersibles of large dimensions, the only type which can render the service which we desire from them."

At that time the only German submarine in service was the U-1, a boat of but 240 tons displacement, although others of 300 tons then were under construction. The U-1, which was commenced in 1902 was driven by two gasoline motors of 200 b. h. p. when on the surface, and by an electric motor of 240 h. p. when under the water.

It is interesting to compare the U-1 with the U-41 to U-60, and U-61 to U-65, which were under construction during 1914. The latter five boats were for Austria.

| | U–1 | U–41 to U–65 |
|---|---|---|
| Length | 127′ | 227′ |
| Breadth | 11¾′ | 23½′ |
| Surface Draught | 9¾′ | 10′ |
| Surface Displacement | 185 tons | 675 to 685 tons |
| Submerged Displacement | 240 tons | 835 to 860 tons |
| Total B. H. P | 400 | 2500 |
| No. of Propellers | 2 | 2 |
| Max. Surface Speed | 11 knots | 17 knots |
| Max. Submerged Speed | 8 knots | 10½ knots |
| Surface Cruising Radius | 1400 miles at 8k. | 2000 miles at 12k. |
| Submerged Cruising Radius | ............... | 100 miles at 6k. |
| No. of crew | 14 men | 38–40 men |
| Armament | 1 T. P. tube and 3 torpedoes. | 4 T.P. tubes, 8 torpedoes and two 0.88 mm. guns. |

From the above it will be understood that Germany made great strides in five years. Therefore, what are the developments made during three years of war in which the submarine is her only hope? Does it not seem logical that a nation dependent upon the submarine should have made some great developments in its construction?

## A STITCH IN TIME!

The sailing ship "W. E. Burnham" was recently becalmed with a cargo aboard for 60 days. Her owners now are installing two Fairbanks & Morse marine oil-engines of 100 b. h. p. each. Thus will all profit by experience.

## MAIDEN VOYAGE OF THE M. A. "S. I. ALLARD"

In the August issue of "Motorship" it was mentioned that the McCormick-owned motor auxiliary schooner "S. I. Allard" had made the run on her maiden voyage from Astoria, Ore., to Honolulu, a distance of 13½ days, with 2,000,000 ft. of lumber aboard without a single complaint of any kind from the engines. On July 19th, the "S. I. Allard" arrived in Sydney, Australia, after a run of 26 days from Honolulu. During this time she averaged 20 barrels of fuel-oil per day, her oil engines turning at 195 r. p. m.

Chief Engineer A. H. Gardner in a letter to the owners dated July 20th, wrote as follows:

"The M. S. "S. I. Allard" arrived yesterday morning at 10:30 a. m. in Sydney harbor, twenty-six days from Honolulu. The engines ran continuously with the exception of a few stops when changing injection devices.

"Four days before coming into Sydney I discovered cylinder head No. 2 on starboard engine cracked. I stopped the starboard motor and took the broken head off and put one of the spare ones on. I have that crack electric welded and the head can be used again. Otherwise the engines were ready to start on the return trip again. I have on hand 1,366 bbls. fuel oil and 1,645 gallons engine oil left.

"Everything went O. K. so far and I hope I'll be able to bring her back as good as she is now. Those engines are wonderful little engines, too bad we haven't got more power."

The owners of the "S. I. Allard," commenting on the above remarks state that:

"You will notice that the engineer while entirely satisfied with the engines as such, notices the lack of power for such a large displacement (5,100 tons), but, as we stated before the 320 b. h. p. unit of the Bolinder-type was the largest unit of the hot-bulb oil engine that was then on the market. Had the 500 h. p. unit been developed at the time of our purchase we certainly would have installed two 500 h. p. units.

"On the other hand these engines worked so smoothly that the engineer is so well pleased with their operation on this long continuous run, but could wish for a larger unit, which would be a natural development of this practice.

"Personally we are very well satisfied and consider the 'S. I. Allard' has made a very creditable showing so far in her operations, and it is evident on this trip that the 'Allard's' sails were of little or no use. There are several sailing vessels out at this time for quite a while without being reported, viz: the Bk. 'Nelson' sailed from Columbia River to Sydney on May 25th and as yet has not arrived."

The "S. I. Allard" by the way is fitted with an electrical steering gear designed and fitted by the Herzog Electrical Engineering Co., of San Francisco in conjunction with Mr. W. H. Hewitt, the consulting engineer for the owners.

## LIVES LOST THROUGH SUBMARINES.

From the beginning of the war up to June 30th last 9,748 persons have lost their lives through the sinking of merchant ships. Of these 5,920 were seamen and 3,828 were passengers.

## MOTORSHIP NOTES.

The motorship "Verda E. Turner," 420 tons recently completed at Westlake, La., by the Clooney Construction & Towing Co. for Capt. N. E. Turner of Vinegar Bend, Ala., has been purchased by the American Exportation & Transportation Co. of New York City.

The motorship "Nissequogue" was recently launched at Brunswick, Ga., for R. Laurence Smith of New York City. She is a four mast schooner of 650 gross tons, 1300 tons capacity, 205x39x14.3, and powered with two 150 h. p. Mietz & Wiess surface ignition engines, of four cylinders each, 14 inches bore, 18 inches stroke.

Two Diesel powered fishing schooners are building at Gloucester, Mass., at the yards of Owen Lantz for John Chrisholm & Son of Gloucester. They are 108 feet long and will be powered with 120 h. p. New London Ship & Engine Co., four-cycle Diesel engines.

A wooden auxiliary motor bark is building at Mobile, Ala., by the Ollinger & Bruce Drydock Co. for Capt. E. A. Pearce for service between Mobile and Cuban ports to cost $100,000. Two Diesel engines driving twin screws will be installed.

In these days of auxiliary motor ships and the conversion of steamers to motor power, it will surprise many to learn that the steamer "Mohawk" and the steamer "Rhode Island" of New York are being converted into five and six mast schooners at Noank, Conn.

The motorship "Virginia Pendleton" building at Mystic, Conn., by Pendleton Bros. for their own use has recently been launched and will shortly go into commission. She is a 5 mast schooner, steel keelson, steel strapped and is powered with two 320 h. p. Bolinder oil engines driving twin screws. A sister ship is also in the course of construction.

The Diesel engined fishing schooner "Francis S. Grueby," owned by Mary E. Parker Green of Boston, has been purchased by A. L. Parker, of Boston, Mass. The vessel is powered with a 120 h. p. Nlseco Diesel.

The steel bark "Svaland," formerly the British ship "Scottish Moors," and now rigged as a four-masted schooner, is at New York getting two 320 h. p. Bolinder oil engines installed. She is a vessel of 4,000 tons d. w. c. 300′x42′x42.4′ in size.

The motorship "Carmela" was sunk by a submarine on July 24. She was powered with two 160 h. p. Bolinder oil engines, and bark rigged, of 2,220 tons d. w. c.

The motorship "Virginia Pendleton," a four mast schooner recently launched at Mystic, Ct., is at New York having her 320 h. p. Bolinder engine installed.

The motorship "S. T. Co., No. 5," a four mast schooner recently launched at Mystic, Ct., and purchased by the Standard Oil Co. is at New York having her 320 h. p. Bolinder engine installed.

The motorship "S. T. Co., No. 6," a schooner owned by the Standard Oil Co., and recently launched, is at New York having her 320 h. p. Bolinder engine installed. She is a vessel 236 x40x19 and of 2,000 tons d. w. c.

The Kawasaki Shipbuilding Co., of Kobe, Japan, is said to be completing some large submersibles, each of 700 tons surface and 1,070 tons submerged displacement. The engines, also built in Japan, are of F. I. A. T. design, and two of 1,300 b. h. p. each are installed per boat, so that the speed will be about 19 knots.

To further the marine oil engine industry there has been formed in Great Britain an association known as the British Marine Oil Engine Manufacturers, and the temporary chairman is Mr. J. Milton, chief-engineer to Lloyds Register of Shipping. Promotion of the industry will be assisted by the mutual interchange of experience, for standardizing designs as far as practicable, and for carrying out such investigations and research work as may be necessary for the proper development of this type of machinery. Such an association is urgently needed in this country also.

# Troubles of American Motorship "Glenpool"

By GEORGE NICHOLSON, C. M. M., U. S. N. R.

NO doubt there have been many bad impressions made upon the minds of some of our American shipowners and seafaring men by some particular Diesel-engined ship, and it is particularly unfortunate that this is so, as it in a measure causes a temporary setback to a march of progress of a prime mover for vessels that is second to none—the Diesel motor—and most all the trouble has been caused by two-cycle Diesel-engined ships.

There has been one notable failure of a two-cycle engined ship in service on the Atlantic Coast, the "Glenpool II," a 6,500 ton d. w. c. vessel, owned by the Standard Oil company and in operation between New York and Tampico, Mexico. She was formerly the German ship "Hagen," and was built by the Krupps of Kiel. She ran for a few months prior to the war, not very successfully, and was in New York undergoing repairs at the outbreak of the war. She was interned for nearly a year, when changing to American registry and renamed, she was again placed into service by the Standard Oil company.

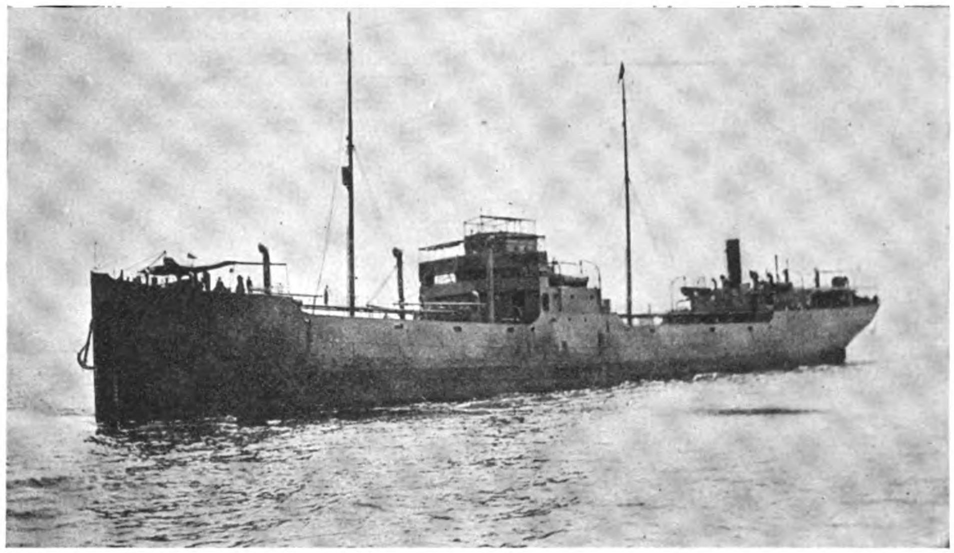
"Glenpool" has undoubtedly been one of the most expensive vessels in the world to operate, as the report of the Standard Oil company shows. Her main engines were built by Krupps of Kiel and there is every evidence to substantiate the idea that the Krupps were experimenting at the Standard Oil company's expense when they placed those engines in the vessel. They are of 6 cylinders each, of 1250 b. h. p. of the two-cycle single acting type, with two scavenger cylinders arranged on the side of the engine, driven from the cross-heads of the two center working cylinders through rocking levers. The air compressors for the supply of starting and injection air and for maneuvering are separately driven by auxiliary 250 h. p. four-cycle Krupp Diesels and also by steam—a donkey boiler being used for the deck and engine room auxiliaries, so that the main engines themselves consist only of the working cylinders and the scavenge pumps. Scavenging is effected by means of valves in the cylinder cover, there being two per cylinder. The scavenge pumps are supported from the engine frame and raised above the engine room floor level. A stuffing box is provided at the bottom of the cylinder, to prevent the escape of exhaust gas into the engine room.

The cylinders are supported on an A-shaped frame formed by box columns fixed to the bed-plate, and the cross-head guide surfaces are formed on the inside of the columns and are water-cooled. The speed of rotation is 125 r. p. m. comparatively a high speed for such large engines. For reversing a single cam-shaft is employed on which both ahead and astern cams are mounted, and this is moved longitudinally to bring the astern or ahead cams underneath the valve levers, according to the direction of rotation required. The movement is effected either by hand or by means of a small compressed-air motor, and a maneuvering hand wheel is provided, which allows the engine to run up on compressed air, and finally brings full on to all the cylinders for full speed. Before moving the cam-shaft longitudinally, all the valve levers are raised off the cams, in the usual manner adopted with two-cycle engines when this method of reversing is employed.

On the very first voyage to America it was found that the original cylinder covers which were made of cast iron, repeatedly developed cracks and caused serious trouble, the bearings both main, and big end and connecting rod, gave serious trouble, oil in streams had to be poured on them, the engines could not be run at full power at sea for even four or five days, stoppages were many and at frequent intervals, and the cast iron cylinder covers were replaced with ones made of manganese bronze, still trouble arose due to the high temperatures being developed in the combustion chambers, which is apparently inherent in the two-cycle design, repairs were often and delayed the ship in port days and weeks and months—indeed the statement given out by Mr. F. D. Asche, vice-president of the Standard Oil Co., clearly indicates this. Mr. Asche states: "In speaking of our experience with motorships break of the war. I do not consider that we have had a fair chance to prove what these ships can do. Neither do I consider that because the 'Glenpool' has not proved an efficient vessel it necessarily follows the other three will not do all we expect of them.

"Circumstances created by the war have interfered with our motorship experiments, but we have not given up by any manner of means.

"We are now getting about 50 per cent. efficiency out of the 'Glenpool' and she is one of the most expensive ships to operate that we own. She



MOTORSHIP "GLENPOOL"

it has been stated that we have burned our fingers and are sore. The truth of the matter is that we do not feel that we have been able to give the motorship a fair trial. Our experience so far, while it has been extremely costly to us, has not shaken our faith in the scheme of motor propulsion for sea-going vessels, although our Diesel-driven vessel 'Glenpool' might be called a failure, but even then the Standard Oil Co. is not sore and does not feel that it has burnt its fingers.

"Because the 'Glenpool' has not been a success it is no indication that the whole idea of the motorship is an established failure. That attitude might have been taken toward the first automobile, the first aeroplane, or the first submarine, none of which was an immediate success. I believe that the four-cycle Diesel, as manufactured by Burmeister & Wain, is an efficient, economical and dependable power plant. We have made an effort to have Burmeister & Wain build engines for us, but were informed that these builders have contracts that will keep them busy for the next three years. This concern was too busy to assist us in remedying the faults in the 'Glenpool's' engines.

"The 'Glenpool' is one of four vessels that were built and engined for the Standard Oil Co. by Krupps in Germany, and is the only one of the four that has had a real testing out. Two of the other ('Wotan' and 'Soki') have made only one or two voyages, and one ('Anna Reiderman') a vessel of 15,000 tons and probably the largest motorship in the world, has yet to make her first trip.

"All three of these vessels are tied up in German ports, where they have been since the out- is almost constantly in need of repairs and her Krupp-built engines have never given satisfaction. We tried various cures on the 'Glenpool's' engines, but none has worked much improvement in her power plant. We even went so far as to put in bronze cylinder heads. One engineer recently offered to put the 'Glenpool' in drydock and put her engines in shape, but after going over his proposition carefully we concluded that he couldn't improve matters to any considerable extent. Her repairs and improvements have already cost us several hundred thousand dollars. However, it is wrong to say the Standard Oil Co. has washed its hands of the motorship. We haven't. The very fact that we have spent great sums for Diesel-driven ships proves beyond question that we believe in this means of propulsion."

Thus it is seen how the troubles of some particular Diesel-driven vessel has been given wide notoriety. This vessel might or might not be called a failure, certain it is the two-cycle engined ship of both reliability and economy will be evolved some day and a trend in this direction is shown by the remarkable success of the two-cycle Diesel ship "Hamlet." However, the fact remains that the four-cycle Diesel engine is the practical engine of today, as the very many successful four-cycle Diesel-engined ships in operation will vouch for.

It only recently was called to the attention of the writer that a certain noted professor in engineering in a New York university was telling his pupils that the two-cycle Diesel was in use abroad practically to the exclusion of the four-cycle type, quite a wrong statement to make, in view of the real facts, that the four-cycle Diesel is the type used abroad.

### READ "MOTORSHIP" AND BE ACCURATELY INFORMED!

Apparently emanating from someone in the U. S. Shipping Board Emergency Fleet Corporation the following two paragraphs appeared in the "New York Times" for September 8th, in connection with a special report on the work of the Fleet Corporation:

"Diesel engines and engines of that type—the original type is being developed in Sweden—will be used as far as is possible. It is understood that a number of the Diesel engines have been brought to this country and that manufacturers have been hard at work for some time developing a standard engine along the same lines. They permit of greater speed and a tremendous saving in fuel.

"German submarines of the best type make from 8 to 10 knots submerged, and not more than 15 knots on the surface. The latter practice has proved an exceedingly dangerous one since the merchant vessels have been armed and convoyed. When smoke bombs and other inventions to blind the submarines have been employed the faster ships have been practically immune."

Let it be hoped that the Shipping Board Fleet Corporation will take some definite action regarding Diesel-driven ships without further delay. In the above, however, reference to the original type of Diesel engine now being developed in Sweden the "Times" reporter seems to be under some little misunderstanding. Probably what the officials meant was that they are considering using the McIntosh & Seymour Diesel engine, which company is working under a Swedish license.

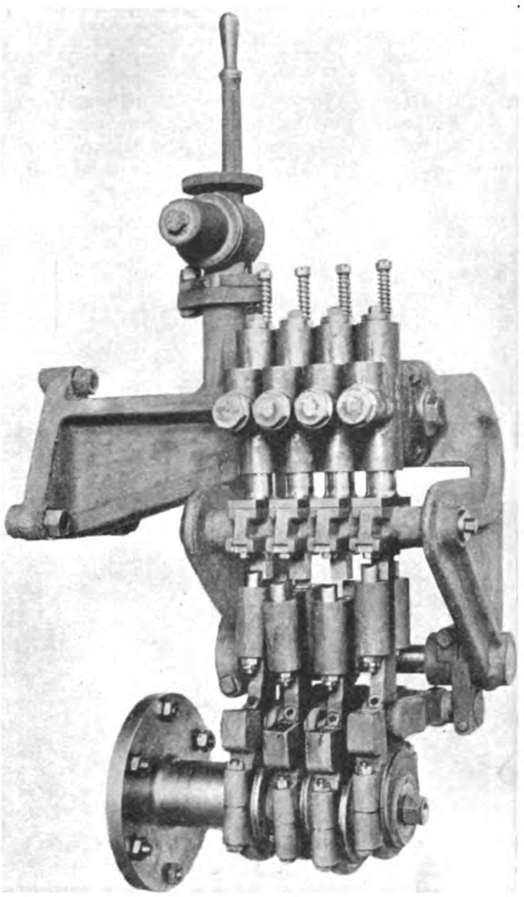
The statement regarding the German submarines very obviously is inaccurate. Correct details and dimensions of the 1914 class of U-boats appear elsewhere in this issue of "Motorship."

### MARINE OIL ENGINES IN JAPAN.

A considerable number of marine surface ignition oil engines of the hot-bulb type have been manufactured by the Ikegai Iron Works of Tokio, Japan. This company is one of the largest builders in the East, of marine motors. One order which they recently completed was for 600 gasoline-kerosene motors of the four-cycle type each of 30 b. h. p. for the Russian Government.

### A NEW AIR-DISTRIBUTOR.

An absolutely reliable air-distributor is the most important feature, with the exception of the direct reversing mechanism, in a marine oil engine. This is the view that Mr. Carl Engel of the Seattle Machine Works holds and with this in mind he has designed a distributor which incorporates many advantageous features. This distributor has been installed on several Eastern marine oil engines now in operation.



Mr. Engel states: "There can be no doubt that every manufacturer of marine oil engines is doing his best in trying to overcome difficulties in air distribution in order to overcome unnecessary wear upon parts. This wear requires a great deal of attention as well as lubrication. In order to overcome this unnecessary wear and lubrication I have designed my distributor." He states further that: "the average working time (activity) of an air distributing valve for direct reversible purposes is less than one per cent of the total working time, consequently these valves are running idle and wear 99 per cent of the time. I have found it worth considering."

The accompanying illustration is of the valve designed by Mr. Engel, which is only in operation when starting or reversing the engine. This valve can easily be attached to any oil engine with very little alteration, and can be placed in such a position as to be able for the attendant or engineer to reach and operate without delay. There is absolutely no manner in which one could reset the valves in a wrong position. Each valve remains at all times in conjunction with the respective cylinder and is permanently connected to an air check valve close to the cylinder. The air checks will remain closed when the engine is running, or when the air distributing valve is shut down.

# Light on the M. S. "Sebastian" Mystery

THE arrest during September of a number of I. W. W. officials and agitators has brought to light evidence that their efforts have been specially directed against oil-carrying tankships during the last few months. No doubt the Industrial Workers of the World ("I Won't Works") activities were not disconnected with the recent mysterious fires that occurred aboard two oil tank steamers and the motor vessel "Sebastian," respectively.

Since the war with Germany was declared by America the German-inspired I. W. W., so far as the East is concerned, has concentrated all its efforts to gaining a foothold among the oil tankship crews and longshoremen at Bayonne, N. J., where the great oil refineries are situated and from where many tankers sail for Europe with valuable oil-cargoes for our Allies.

The particular object of the agitators has been to get men on board oil tank-ships, plying between this and allied ports, so they might stir up discontent among the crews and cause all the trouble possible at sea. The skippers of all tank ships have been warned to be constantly on the watch for I. W. W. trouble makers, and the moment one is found to lose no time, if at sea, in putting him in irons, or if on shore, promptly to turn him over to the Federal authorities.

During the recent Western activities of the I. W. W. Government agents discovered that agents of the organization had made an effort to corner the entire available supply of phosphorus in the United States. A few weeks before the raid on the I. W. W. there was a considerable amount of phosphorus for sale by a concern in Salt Lake City. The Secret Service made an investigation, and found out that the entire supply had been bought up by the I. W. W. The phosphorus was to have been extensively used in carrying out the plot to destroy the wheat and corn crops of the West. The phosphorus was made into balls and then soaked. These were to be dropped into the wheat fields, and following a chemical reaction the grain would be fired and thousands of bushels destroyed.

Herein lies the probable key to the solution of the mystery of the disastrous fire aboard the British motor tank ship "Sebastian," and the other tankers. It may be remembered "Motorship" hinted that some form of chemical must have been used by German agents, and the matter no doubt will be followed up by the Federal Secret Service. The "Sebastian" a day or two before the fire sailed from Bayonne with a valuable and greatly needed cargo of oil for the British Government.

While the scheme evidently was a very simple one, it showed considerable cleverness and doubtless the arrangements of this vessel's machinery carefully had been studied; but, it may have needed an agent aboard, and in these days of marine engineer shortage, that would have been easy. There was a shortage in the engine-room staff aboard the "Sebastian" for several voyages, and on one occasion endeavors were made to get assistants in New York. The secret service department will do well to ascertain from the New York agents of the ship if any of the crew on any recent voyage were taken aboard when in America, and if so, their history traced.

After the discreet distribution of some sort of phosphorus compound roundabout the engines and engine-room and even in the oil filter followed by the start of chemical action, all that the I. W. W. agent had to do was to take advantage of the chief engineer temporarily being in his cabin, and stuff a little cotton waste into the mouth of the filter fuel-outlet pipes, and—voila! And without any suspicion being cast upon him, too; because the oil would not have overflowed for some minutes later, giving him time to get out of the engine-room before the fire occurred.

It will be recollected that the oil-pipes leading from the filters to the engine-feed containers choked causing the solar-oil fuel to overflow on to the engines and engine-room floor. There was an instantaneous burst of flame, which like a flash spread right across the engine-room making it absolutely untamable. Without some sort of human agency the pipes leading from the filters could not have become choked, as the filter itself positively collects all dirt and other foreign matter before the oil can pass through the outlet pipe.

Evidently the I. W. W. agent considered his own skin as the fire occurred not far off Nantauket during calm weather where aid for the crew readily could be obtained, several U. S. A. naval craft being in the vicinity.

Tests afterwards made by Mr. Arthur West of the Bethlehem Steel company proved conclusively that the mere fact of oil overflowing on to the Diesel engines could not have caused flame or a fire.

The work of rounding up the I. W. W. conspirators has lasted for more than six months and the mass of evidence which has been turned over to the Department of Justice is said to be a story of contemplated lawlessness, the like of which no other country has ever seen. It was the Secret Service, under the direction of Chief William J. Flynn, which gathered the greater part of the evidence against the lawless organization.

### DANISH WOODEN MOTORSHIPS.

There are now building in Denmark ten wooden motorships of standardized design and of 500-600 tons d. w. c. each. This is in addition to a large number of big steel Diesel motorships at the B. & W. shipyard.

### PROSPECTING FOR OIL IN REPUBLIC OF PANAMA.

It is announced that an American company has decided to make a thorough investigation and test of the possibilities of finding oil in large quantities in the Republic of Panama. Geologists from the United States have already made a survey in the Province of Bocas del Toro in the Colon consular district and have found locations favorable for boring for oil. The work of exploration will be continued in other provinces of the Republic, as well as in adjacent parts of Costa Rica. It is stated that the company is prepared to expend half a million dollars in this effort to find oil.

# Motorships and Their Operation

Series II

## THE MOTORSHIP "ANNAM"

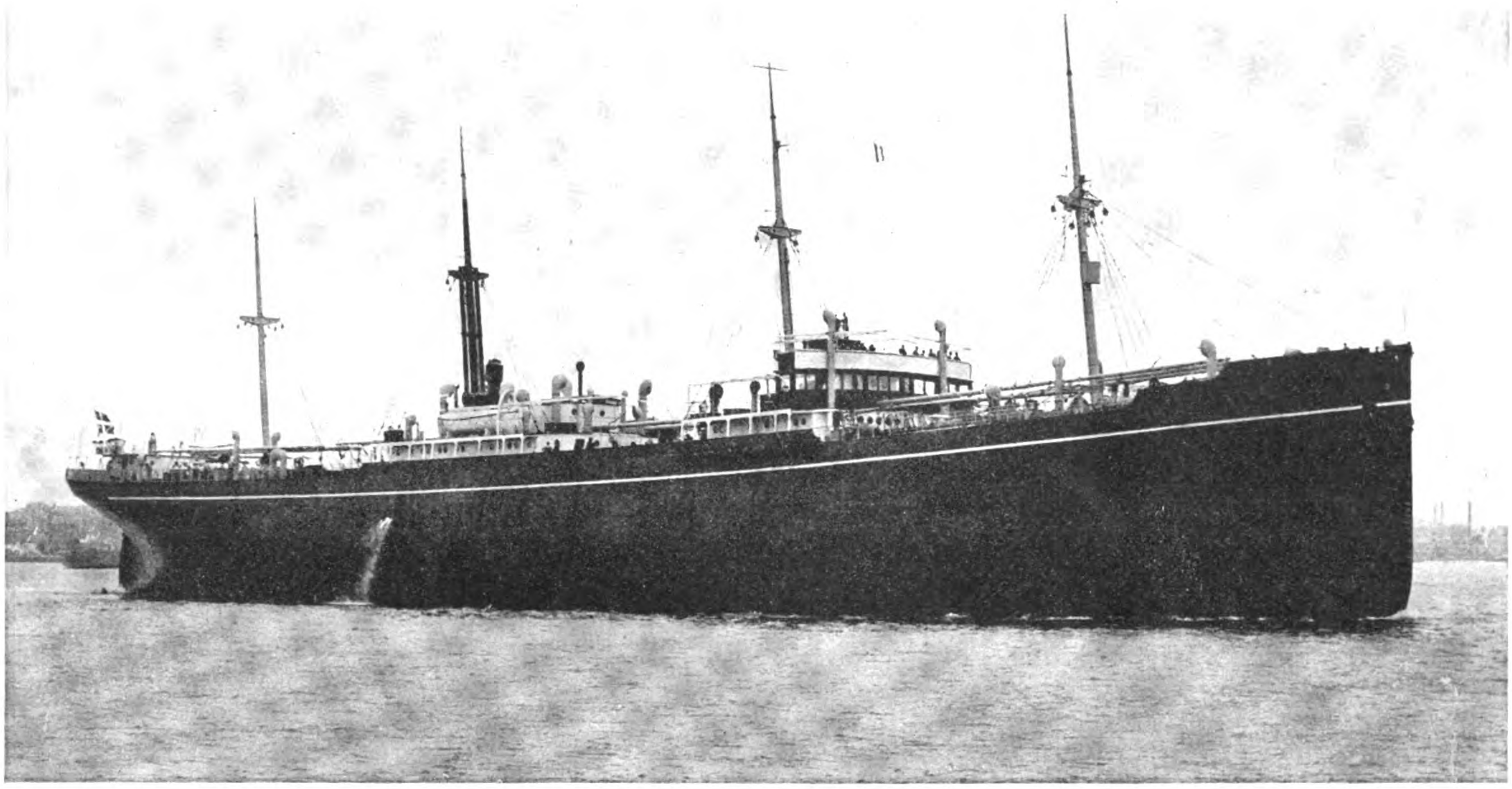
*So many false and unfounded reports and exaggerated rumors are afloat regarding the running and operation of motorships, that we have decided to combat this malicious influence by regularly publishing a series of articles on the operation of existing motorships, paying particular attention to domestic-owned vessels, and thus enable shipowners to ascertain for themselves as to how much credence can be placed in these base stories. We shall give the facts exactly as placed before us by the owners of the individual ships concerned, and even vessels that may have proved unsuccessful—for we will not deny that a few have been failures—will be dealt with; but in such cases we believe that we shall be able to produce sufficient evidence to demonstrate that the principle of the internal-combustion-oil-engine is not the responsible factor of non-success. We appeal to all motorship owners to co-operate with, and to assist us, in this campaign which will be to the ultimate benefit of the entire motorshipping industry.—The Editor.*

WHEN a motorship logs a quarter of a million miles in 4¼ years it is time for shipowners to sit up and take notice. This is the record of the M. S. "Annam." It was our original intention to make the Vacuum Oil Co.'s M. S. "Bramell Point" the second of this series of articles; but, owing to unforeseen circumstances the owners are not yet ready to supply us with the necessary information, so the operation-report on that good ship is unavoidably postponed for a few months.

However, we took advantage of the recent visit to an Atlantic port of the big Diesel-driven motorship "Annam," to go aboard and obtain details of her 4¼ years operation and to inspect her machinery. This vessel has been chartered by W. R. Grace & Co., of New York, so that the "Annam" will be a frequent visitor to this country. Furthermore, she is the largest motorship running under American directorship—and—the only pity is that she is not United States designed, built, and engined, as she would be a credit to this country's merchant marine! But, instead we have to take off our hats to the enterprise and foresight of Danish engineers, shipbuilders, and shipowners.

We were accompanied in this visit to the M. S. "Annam," by Mr. Bernard Mills of the American-Hawaiian Steamship Company and spent a very educational and pleasant afternoon as the guest of Chief Engineer C. J. J. Steiness, an old steam man who has had 25 years at sea and six years experience with Diesel motorships, commencing with the M. S. "Selandia" early in 1912. We mention that we were accompanied by an official of the American-Hawaiian Steamship Co., because, to an extent this company set an example that may well be copied by other American steamship owners, inasmuch as they spare no time or effort to make a thorough investigation into nearly every motorship visiting Atlantic ports.

The time will soon come, we believe, when the American-Hawaiian S. S. Company will be the leading Diesel motorship owners in the United States, in which event they eventually will be in the position to control and dictate freight rates between Atlantic and Pacific coast ports should they so desire. That is what motorships will mean for them, although we do not for one moment suppose that this side of the question has even been considered by them.



MOTORSHIP "ANNAM"

During the 4¼ years (June, 1913, to Sept., 1917), that the M. S. "Annam" has been in service she has logged no fewer than 225,585 nautical miles, which in itself is sufficient to prove beyond dispute the reliability of her Diesel-type oil engines. Yet for three years she ran solely on Taraken crude fuel,—a very heavy Borneo oil that before the war could be obtained very cheaply by ships operating in the Far East. When it is considered that the "Annam" carries in her double-bottom sufficient fuel for about 110 days "steaming" fully laden, or a distance of over 40,000 nautical miles, it will be understood that she does not have to waste much time in port taking in fuel, which really must mean many days saving of time in a year. She would have covered a greater mileage than this even; but, not long ago she was held up at Wilmington, N. C. for one month just waiting for cargo; and at Kingston, Jamaica, for two months for the same reason. Except for this, her mileage record would have been increased by 15,000 to 20,000 nautical miles.

As may be expected with a motorship built so many years ago she has had her little machinery troubles; but not more than the average tramp steamship of her size. Wear of her working parts has been very slight, the cylinder liners and the main bearings having worn down less than 3/10th of a millimeter respectively, although the crosshead brasses have worn more than would be the case with a steam engine. The "Annam" engines are old Burmeister & Wain models with trunk pistons, so that adjustment of the crossheads and guides may not be quite so accurate as with later models which have box, or short, pistons. They have eight cylinders instead of six as now adopted by the makers.

For the first two years the engines were run without removing the pistons for cleaning. Although the pistons are oil-cooled there have been no cracks. Seeing that the trunk-pistons are open at the bottom it has been possible to use a jet of oil for cooling without danger, which would not be the case with box pistons; but, taken all 'round the engineer of the "Annam" would prefer water-cooling.

Last year one cylinder liner cracked, and about three months ago three cylinder heads cracked, but still are in use. In the second instance the ship had run on a sand-bank consequently the cooling-pump forced sand into the space between the fuel-injection valve and the exhaust valve choking it up, thus causing local temperatures and unequal stresses, so naturally the metal went.

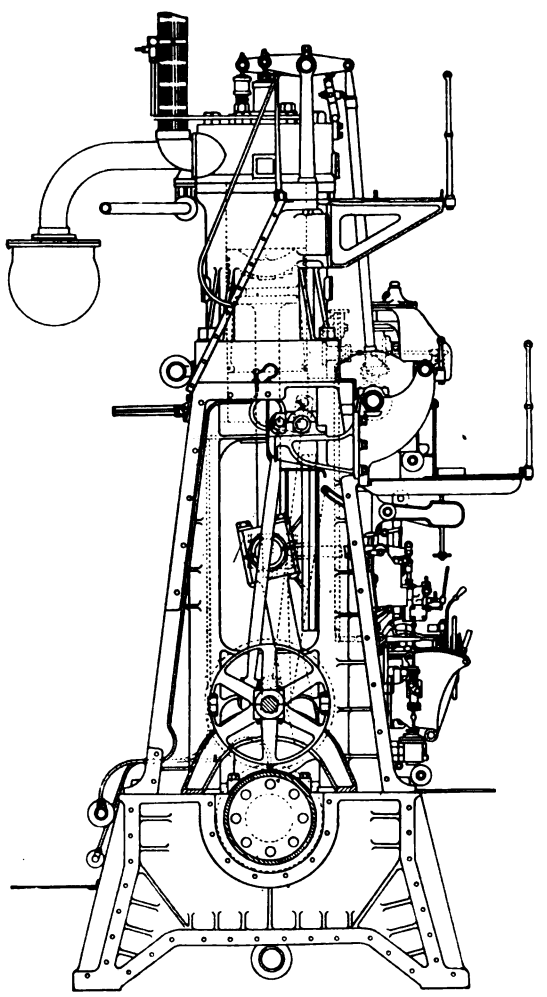
With this ship the exhaust-valves are ground-in twice per round voyage of 28,000 miles, and the largest non-stop run made was of 42 days duration, or roughly six weeks. At the same time it should be pointed out that it only takes 3½ hours to change the valves. Much rests with the operator of the engines, who uses his own judgment.

At present all the best Danish engineers are mobilized and good marine mechanics and operators are scarce, consequently Chief Engineer Steiness has great difficulty in impressing upon his assistants the vital importance of handling certain parts with great care when overhauling, and that it does a valve no good to drop it on the floor, and dent the seat, or bend the stem; or to drop a hammer on the fuel injector, etc. Little things like that prevent reliable operation, but the assistants often appear to regard such with unconcern.

No abnormal pressures are used with her two large Diesel propelling engines, the cylinder compression being between 450 lbs. and 468 lbs. per sq. inch, while the fuel-injection pressure is from 560 to 870 lbs. per sq. inch. This has to be varied

according to the kind of crude-oil fuel used. When we were aboard the M. S. "Annam," the fuel used was a Californian oil supplied by the Union Oil Co., and was of 22° to 23° baumé. The lubricating-oil used is a mineral oil furnished by the Vacuum Oil Co., known as their D. T. E. brand, and which the Chief said is a fairly poor quality of lubricant and cheap compared with some of the other brands produced by the Vacuum people, the better oil not being necessary. Chief Engineer Steiness is strong for mineral type lubricating oil. The same oil is used for the cylinders as for the bearings, although in the early days two distinct kinds of lubricants were used.

Great flexibility in operation has been found possible, and Chief Engineer Steiness can keep her engines "ticking away" at fifty revolutions per minute, or at any speed up to full load of power. The actual revolutions, with the ship under full load of cargo, are 126 per minute, or 132 r. p. m. when in ballast. The 126 r. p. m. drive her at an average voyage speed of 11.5 knots on a fuel consumption, including all auxiliaries,



END VIEW OF ONE OF THE DIESEL ENGINES OF THE "ANNAM"

of 10.5 tons (73½ barrels) per 24 hour day, although when with about 6,800 tons of cargo aboard and about 1,200 tons of oil fuel in her bunkers the speed may be a fraction less. This performance with a steamship would be an absolute impossibility.

Her two engines at 126 r. p. m. together indicate in the ship 3,100 h. p. As they were designed to have a normal output of 3,000 i. h. p. at 125 r. p. m. and to drive the ship at 11¼ knots, the everyday results may be considered excellent. At the time of our visit some overhauling was being done on the engines and several cylinder heads were off, so that we could see the perfect condition of the insides, which was sufficient to indicate that the life of a pair of engines, such as those in the "Annam," under ordinary conditions will prove to be fully as long as that of the average marine steam engine, or even longer, because a better quality of material and workmanship is incorporated in the Diesel engines.

The engine-room crew is as follows:

1 Chief-engineer
3 Assistant-engineers
4 Junior engineers
4 Oilers
1 Electrician (also attends to deck machines)

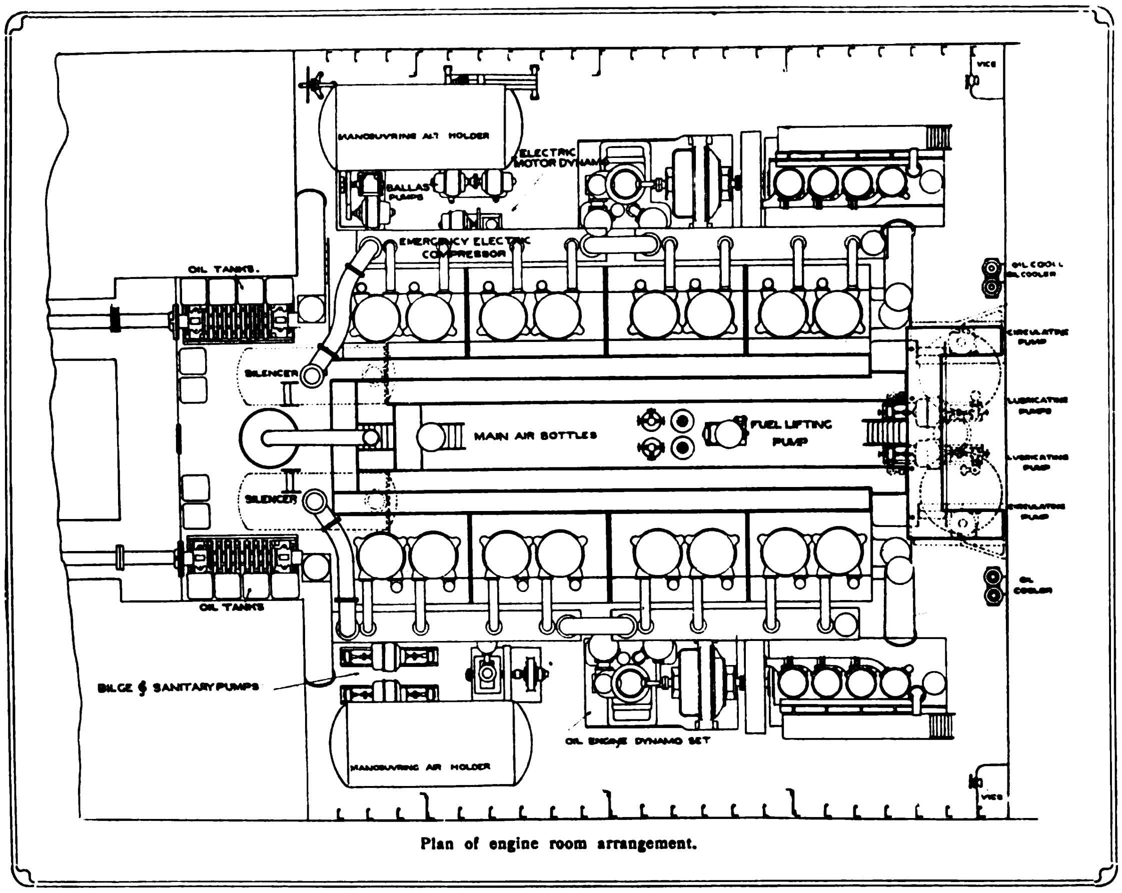
Total—13 Men

On an American oil-fired steamer of the same horse-power the following engine-room staff is carried (these are owners' figures, as are the wages):

1 Chief-engineer
3 Assistant-engineers
6 Oilers
3 Water tenders
3 Firemen
1 Store-keeper
3 Wipers
1 Deck-engineer

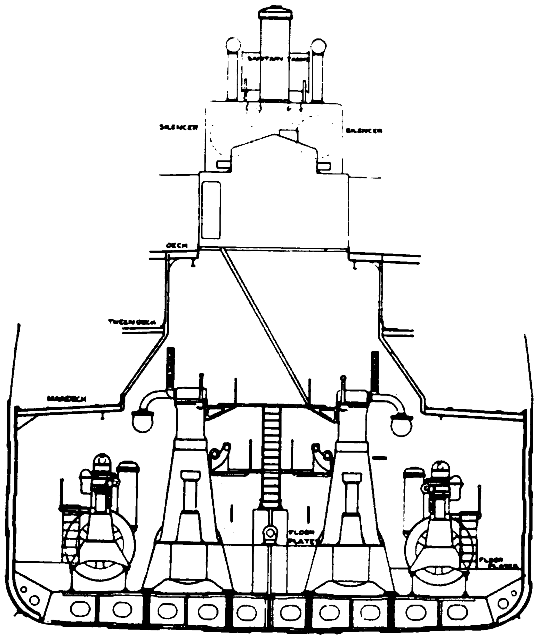
Total—21 men

Ocean-going engineers of the American company referred to now are receiving 50 per cent war bonus on their wages and their food and keep costs about $1.00 per day. Therefore the wages, food, and bonus of the additional eight men that the oil-fired steamer carries amount to no less than $11,180.00 per annum. If such a vessel was coal fired six extra firemen at $50 per month each with $25 per month bonus and a $1.00 per day food, would have to be carried. That would mean another $5,790.00 per annum or a total engine-room labor saving for the "American Annam" of $16,979.00 every year.




Plan of engine room arrangement.

ENGINE ROOM ARRANGEMENT OF THE "ANNAM"



CROSS SECTION OF ENGINE ROOM OF THE "ANNAM"

Now, the other economies of a motorship are so enormous that it is "Motorship's" strong advice that shipowners take every penny of this big wage saving and give it to the engineers in the form of special bonuses, and thus encourage them to stick to motorships and to study the Diesel engine subject and thus learn all that there is to know about their little peculiarities. Then there will be no trouble over the engineer question, and a far better grade of man will soon develop. The present shortage of Diesel engineers in this country is entirely due to shipowners who do not seem to have sufficient foresight to train men and lads for future use. But that is aside from the operation of the M. S. "Annam." However, we will mention that her Danish owners just now are having trouble in obtaining good junior and assistant engineers owing to mobilization in that country having taken all the good men for the navy.

The general dimensions of the M. S. "Annam" will be of interest. They are as follows:

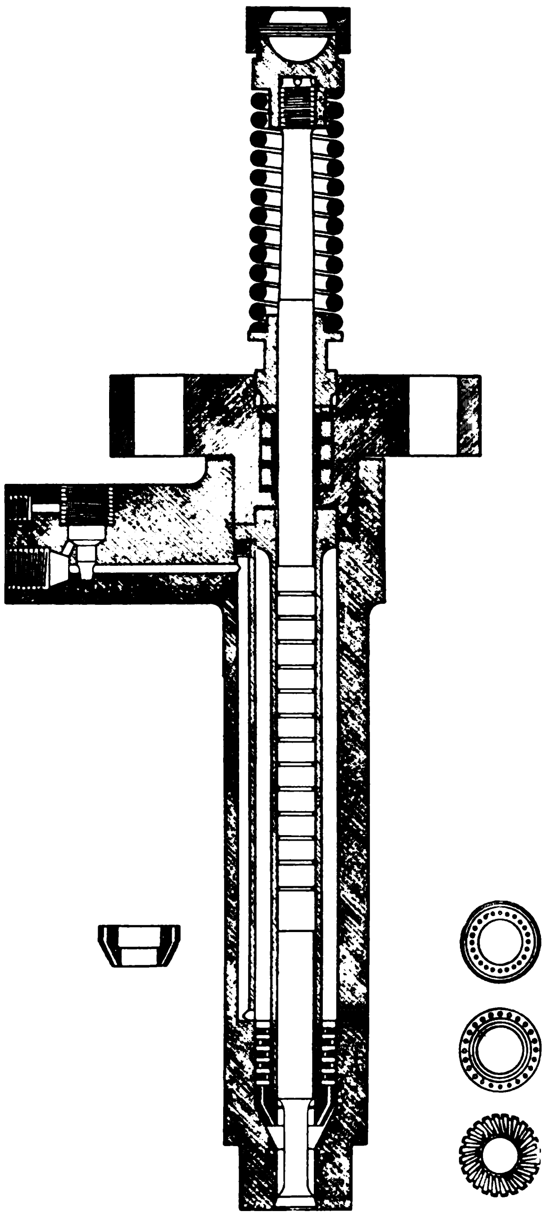
Displacement—13,200 tons.
Fuel-capacity—1,200 tons (8,400 barrels).
Actual cargo capacity—8,600 tons.
Dead-weight capacity—9,300 tons.
Gross tonnage—5,295 tons.
Length—410′ 0″.
Breadth—55′ 0″.
Moulded depth—30′ 6″.
Loaded draught—26′ 5″.
Space for bales of cargo—500,000 cubic ft.
Cruising radius—40,000 miles.
Number of screws—Two.
Indicated horse-power (total), normal—3,100 h. p.
Shaft horse-power (total), normal—2,325 h. p.
Number of cylinders per engine—Eight.
Cylinder bore and stroke—23⅝″x31½″.
Average engine speed—126 r. p. m.
Average loaded speed of ship—11½ knots.
Trial speed (May, 1913)—12.4 knots.
When placed in service—June, 1913.
Daily fuel consumption (incl. auxiliaries)—73½ barrels (10½ tons).
Total horse-power of auxiliary Diesel oil-engines —(2) 600 b. h. p.
Engineers, assistants, oilers, etc.—13 men.
Daily fuel bill with crude-oil at $1.75 per barrel—$115.00.
Fuel-consumption per i. h. p. hour—0.316 lb.

It is only necessary for shipowners to take figures of their steamers of similar displacement and dimensions, and compare them with those above and then the enormous advantage of the Diesel ship at once will be apparent. No wonder a company owning twenty such vessels can defy competition anywhere in the world.

On either sides of the main propelling engines are two 300 b. h. p. auxiliary four-cycle type Diesel engines, each operating a three-stage air-compressor, and a generator which supplies the current for all the auxiliaries and the cargo winches, derricks, etc., one of which can swing 25 tons. There also is a single-cylinder Tuxham surface-ignition type of hot-bulb engine of about 20 h. p. using the same fuel as the marine engines. This drives an electric-light dynamo.

The two propelling engines were originally designed to operate with a mean-effective-pressure of 91 lbs. per sq. inch, and actually develop when desired 1,575 i. h. p. apiece. But the makers class them as 1,500 i. h. p. engines, because according to their experience the same result is obtained

from each of these motors as from a steam engine of 1,500 i. h. p. The mechanical efficiency actually obtained from these motors is 85 per cent as only the H. P. air-compressors are driven off the engines, the other stages being driven by auxiliary motors. Under these circumstances the



FUEL-INJECTION VALVE OF THE M. S. "ANNAM"

shaft (or brake) horse-power is 1,350 b. h. p. per engine, which, of course, differs just a little from the power regularly developed under average ocean-going conditions, and as previously quoted in this article. Here it may be mentioned that, during the maker's tests the fuel consumption of the engines worked out at 0.294 lb. per i. h. p. hour, which is equivalent to 0.344 lb. per b. h. p. hour.

This, however, is not the true consumption figures of these engines, because one of the 300 h. p. auxiliary motors has to be kept running continuously owing to the necessity of supplying compressed-air, and arranging for the driving of the cooling-water and lubricating-oil pumps and for providing electric current for the steering-gear. With some Diesel engines all these accessories are driven directly off the marine engines, while the exhaust-gases furnish sufficient heat for the steam steering-gear. That, of course, merely is a question of different systems of auxiliary operation. However, when the engineers of the "Annam" add the consumption of one of the auxiliary motors (only one is used at sea) the consumption becomes 0.337 lb. per i. h. p. hour or equivalent to 0.395 per shaft h. p. hour.

But the chief engineer gives the average ship propelling power as 3,100 i. h.p. (or 2325 b. h. p.) and the total consumption as 10⅓ tons (23,520 lbs.) per day. This gives 0.316 lb. per i. h. p. hour or 0.421 lb. per shaft h. p. hour. This should be economical enough for any shipowner.

The fuel-injection system is a feature of the "Annam's" engine, and while common to Burmeister & Wain practice, is different to that followed by other Diesel engine builders. Instead of a needle valve, which must be lifted to permit the injection of the charge of fuel, a mushroomheaded valve has been employed by Burmeister & Wain. This opens downwards and permits the use of a direct rocker action exactly as with the ordinary inlet and exhaust valves. From the obstructor plates upwards the details of the valve are quite orthodox. Below these plates the fuel is blown through the spiral flutings of a pulverizer cone into a funnel, through which it is swirled to strike the mushroom head and whirl round the combustion chamber. That the system is very efficacious has been proved by the fuel economy of the " B. & W." class of motor.

For packing the valve stem a series of leather collars are employed, spaced apart by steel cups of slightly greater depth. Both with the steel and the leather the edges which are in contact with the valve stem are mitred, and any air tending to creep up the stem therefore enters between the steel cups and the leather collars, and makes the packing tighter, the action being analogous to that of a hydraulic cup leather. A double-purpose pet-cock is furnished on the fuel-feed pipe to permit the delivery to be tested, and also to enable air to be released when the pipes have to be primed. On the "Annam" the injectors have been varied in a manner which is producing even superior results.

Basically the reversing process is the same as that devised for the first Burmeister & Wain marine engine, but it has been considerably speeded up by the substitution of a turbo-reversor for the earlier reciprocating reversor. Where under the old conditions it took 20 seconds to reverse, the operation can now be completed in six seconds, which is on an equality with the performance of two-stroke motors in the same respect. The turbine which takes scarcely more air than the former reciprocator, exhausts to atmosphere from an initial pressure of 300 lbs. per square inch. It is mounted on a vertical shaft, which passes down between the camshaft and layshaft to the control platform.

# U. S. Shipping Board's First Steel Motorship

**The M. S. "Ada", a Vessel of 3,000 Tons D. W. C. Equipped with Motors Aggregating 1,000 I. H. P.**

UNDOUBTEDLY many shipowners will watch with interest the operations of the new motorship "Ada," and the sister vessel, the latter also recently having run successful trials; because the "Ada" and her sister are the first steel-built ocean-going full-powered vessels to have been taken over by the U. S. Shipping Board, Emergency Fleet Corporation, who apparently will operate them unless chartered to domestic shipping companies.

So far as we can ascertain the "Bramell Point," "Holden Evans," "Pennant," and "Ralph James M. Bullowa" still are being operated by their owners, but under the jurisdiction of the Shipping Board. They, also are steel-built ocean-going motor-vessels.

We illustrate the M. S. "Ada" and it will be noticed that she is to be numbered among the most handsome and serviceable-looking steel motor vessels yet constructed in this country. With her sister ship she was ordered, we understand, by enterprising Norwegians who sold them at a profit while building; since then they have changed hands several times, eventually being acquired by Federal authorities.

The builders of the engines of the "Ada" appear to be doing a tremendous business in marine and stationary oil engines, and they claim a yearly output and sales of 70,000 b. h. p. As present U. S. A. prices are averaging about $110 per b. h. p. it means equivalent to a business of $7,700,000 or nearly seven and three-quarters million dollars per annum, in oil-engines alone.

We have before us a list of some of the more important vessels oil-engined by them. Details are given of 241 ships of 100 b. h. p. or over which aggregate 53,260 b. h. p. without counting the hundreds of little auxiliary oil-engines aboard these ships. No fewer than 61 of these are American-built ships aggregating 24,540 b. h. p.

The M. S. "Ada" is a steel-built ship of 3,000 tons d. w. c. built by the Manitowoc Shipbuilding Co., Manitowoc, Wis., and is propelled by two 320 b. h. p. Bolinder surface-ignition marine oil-engines of the two-cycle, direct-reversible type, these driving twin screws. Together they have an output of nearly 1,000 i. h. p.

The power is low for such a large ship, so naturally the vessels are not very fast, having about 8 to 9 knots speed. The auxiliary machinery, such as deck-winches, and steering-gear are driven by steam furnished by an oil-fired donkey boiler. The consumption of the main engine will be about 0.55 per b. h. p. hour, which at continuous full load will give a consumption of about 4 tons (28 barrels) per 24 hour day. The auxiliary boiler probably will need 7 or 8 barrels per diem in addition so that 35 barrels should cover the total daily-fuel-consumption of this ship, which makes her very economical compared with a steamer of her size.

We are enabled to give, herewith, some details of the trial run of the M. S. "Ada" as follows:

**TRIAL TRIP OF MOTOR SHIP "ADA"**

Saturday, Sept. 1, 1917.

| North. | | Elapsed time. | Statute miles per hour. | Knots. |
|---|---|---|---|---|
| Manitowoc Pier ... | 2:45:00 | | | |
| Two Rivers Pier... | 3:17:20 | 32:20 | 9:32 | 8:10 |
| Twin Rivers Point. | 3:46:00 | 28:40 | 10:55 | 9:15 |

Distance.

Manitowoc Pier to Two Rivers Pier, ..............5 miles
Two Rivers Pier to Twin River Point ..............5 miles

| South. | | Elapsed-time. | Knots. |
|---|---|---|---|
| Twin River Point Light.. | 3:58:00 | | |
| Two Rivers Pier ....... | 4:29:00 | 31:00 | 8:44 |

9.15
8.10
8:44

25.68 ÷ 3 = 8.56. Average speed, knots.

**Complete Turn at Full Speed Ahead.**

Wheel Star'b.: 6 min. 15 sec. Estimated dia. circle, 700 ft.
Wheel Port: 6 min. 45 sec.
Draft, For'd: 5 ft. 6 in. Aft. 12 ft.
Estimated Speed.—Full speed astern, 4½ statute miles per hour, or 3.9 knots.
Engine Revs.—180

# Equipping Existing Ships With Oil Motors

**A Proposal Worthy of Consideration by the U. S. Shipping Board.**

SEVERAL months ago "Motorship" made a suggestion that all existing sailing-vessels be fitted without further delay with engines of the surface-ignition, or kerosene type, and thus considerably increase their annual carrying capacity, an important matter in these days of ship shortage.

We are glad to see our proposal endorsed by our worthy contemporary "Shipping" of New York, and by the British "Motorship & Motorboat." One objection that has been raised by some naval architects and shipowners is that many of the vessels in question are old ships, which would not stand the vibration of the motors.

This objection is not supported by experience, many old sailing ships having been fitted with oil engines. For instance, there was the old ketch "Ceres," a Bristol Channel wooden-built-vessel over 100 years old. Several years ago this ship was equipped with a crude-oil engine and proved to be very successful, and nowhere are the seas more severe on a small vessel than in the waters referred to. Another British vessel, built in 1883 (34 years ago) which was originally built as a tug, was afterwards converted into a sea-going lighter, and is now a schooner with auxiliary power. A still more striking instance is the brigantine "Tyne," built in 1867, which has recently been fitted with two 50 h. p. hot-bulb engines.

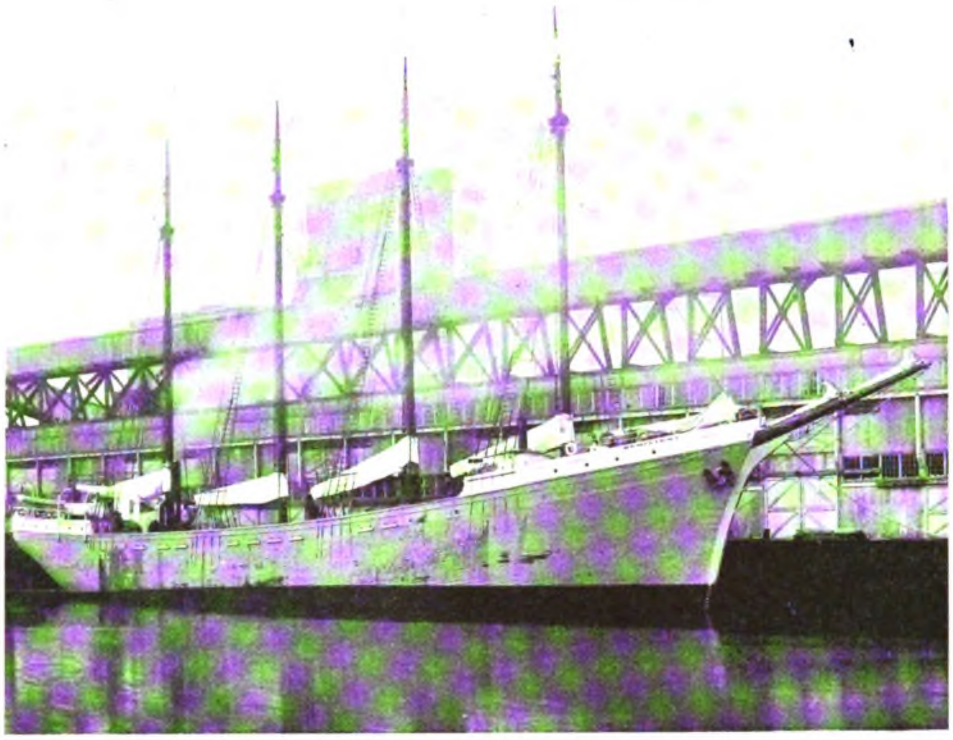
It is said that motors have been installed in wooden ships in which some of the timbers were half rotted through, yet they were put into service and gave satisfactory results. These examples effectually dispose of the objection that the vibration of the motors will prove disastrous. A much more reasonable objection at the present time is that auxiliaries are slow compared with full-powered craft, while being visible from long distances owing to their tall masts and sails, are an easy prey for German submarines.

This drawback can, however, be overcome by sending such vessels to remote parts of the globe, or using them along the U. S. coasts where they can relieve full-powered ships for service in the danger zones. In order to effect the conversion to auxiliaries of existing sailing ships, a certain proportion of the work on new full-powered vessels would, no doubt, have to be suspended, but this policy would be amply justified in view of the more rapid increase in the effective tonnage thereby brought about.

# Mietz-Engined Motor Auxiliary "Remittent"

THE motorship "Remittent" is the fourth four-masted auxiliary schooner completed by the Puget Sound Bridge & Dredging Company for the Washington Shipping Corporation, she, however, becomes the property of Alex. Prebensen Co., of New York.

The "Remittent" is practically a sister ship to the "Tacoma" and "Portland" built by the same



MOTOR AUXILIARY "REMITTENT"

company for the Pacific Motorship Co. Of the two the "Tacoma" has completed her first trip to Callao on the west coast of South America after a successful run of forty-five days from Seattle, and the "Portland" at this time is on her maiden trip to South America, sailing from Bellingham.

Both the "Tacoma" and "Portland" carried a cargo of lumber as will the "Remittent" when she sails from Portland where her cargo will be loaded.

As to dimensions the "Remittent" is 250 feet in length, 43 feet of beam with a depth of 21 feet and a carrying capacity of 2600 tons. Of lumber she is capable of carrying about one and a half million feet.

Features somewhat out of the ordinary for wooden hull construction are the steel reenforcing plates under the deck which run fore and aft the length of the ship. These plates are 24" in width and ½" thick. In place of the ordinary wooden knee usually used in this type of ship, steel knees are used for bracing.

The stem tube is supported by a steel casting on the outside and one on the inside both of which are through bolted to the hull, in fact the method of supporting the stem tube is practically the same as used in steel ship construction.

A wooden rudder is used which, however, carries a cast steel hood at the top to which is attached the forged steel rudder stock.

The deck machinery consists of a single 8x10 steam cargo winch for each hatch also one cargo winch mounted on the forecastle head. The winch serving the after hatch also serves as a warping winch, having extended shaft with gypsey heads. Steam is supplied for all such equipment by a donkey boiler installed on the main deck just aft of the forecastle head, this boiler operating on the same kind of oil fuel as used in the propelling machinery.

The propelling machinery or main engines are two 240 h. p. Mietz (formerly known as Mietz & Weiss) oil engines of the surface ignition type. The cylinders are of 14-inch bore with a stroke of 18½-inch, and on the trial run showed a fuel consumption of about 29 gallons per hour or about 14½ gallons per hour to each engine. Propelling engines as well as the auxiliary oil engine were furnished by the August Mietz Agency of Seattle.

Current for lighting and power is furnished by a 10 K. W. Allis-Chalmers D. C. generator driven by a two-cylinder 30 h. p. Mietz oil engine, which also furnishes power for the air compressor. Somewhat different than the ordinary ship's lighting plant is that of the "Remittent" as she is supplied with a storage battery of 100 type B. 4. H. Edison cells with a capacity of 75 ampere hours at 120 volts which on one charge will light 20 forty watt lamps for twelve hours or a smaller number of lamps for a proportionately longer time.

By operating air compressor and generator from the same engine considerable fuel may be saved, as the advantage of charging the storage may be taken at any time the engine is in operation for driving air compressor and at the same time lights may be used direct from the generator.

Charging of the storage battery is done by bringing the generator voltage to about 120 then by means of the charging switch dividing the battery into two fifty cell sets and regulating the current by means of a charging rheostat located on the special switchboard. A double throw switch mounted on the same board enables the operator to put the battery either on charge or discharge by throwing this switch to the right or left. A no voltage release is put in the charging

On the left, H. A. Lohman, Internal Combustion Engineer with the August Mietz Agency of Seattle, Who Furnished the Engines of the "Remittent"; on the right, A. Chew, Chief Engineer of the Puget Sound Bridge and Dredging Company.

circuit to safeguard the wiring and generator if by chance the engine should be stopped with the charging switch left closed. A completely discharged battery can be fully recharged in seven hours at 15 amperes.

One of the main advantages of such a lighting set is the fact that there is no reason to be without lights at any time. Even should trouble be encountered with the generating set the engine room crew still have sufficient light for hours to make repairs aside from the fact that the cabins can be furnished with light.

The battery and special switch-board were installed by the McCreery Machinery Company of Seattle and furnished from local stock by the Edison Battery Supply Company. Similar sets have been installed aboard the motor auxiliaries "H. C. Hansen," "Tacoma" and "Portland."

The main engines and auxiliaries are fitted with McCord Lubricators the standard type for the Mietz oil engines.

The engine room is further equipped with a steam pump for fire service and bilge pumping which can also be operated on compressed air in an emergency and aside from this pump is an electrically operated pump for the same service. Driven by the same electric motor is a small pump for trimming the oil fuel tanks and by this means oil may be transferred from any one tank to any other on the ship.

The responsibility of any special apparatus and the complete installation is handled by Mr. A. Chew, who is chief engineer for the Puget Sound Bridge & Dredging Co. Mr. Chew is an engineer of unlimited experience, having spent about eighteen years on the Clyde at which time he was responsible for the design of the "Hazel," "Robert" and "Bessie Dollar," three steamships well known on the Pacific coast.

Previous to accepting the present position he acted as engineer and superintendent with the Seattle Construction & Dry Dock Company.

The operation of the propelling and auxiliary engines until the ships are turned over to the owners is handled by H. A. Lohman of the August Mietz Agency. Mr. Lohman has spent a number of years building, installing and operating internal combustion engines, and is capable of keeping them on friendly terms with him.

Capt. C. W. Call, pilot in charge of the trial of motorship "Remittent," states that he feels as much at home on a motorship as he does on a steamer, and according to engine room crews he seems to understand the oil engine almost as well as they, at least his handling of the ship would lead one to believe so. His log of the trial of the "Remittent" follows:

Record of trial trip of M. A. "Remittent," Sept. 21, 1917, on Government course on Puget Sound.

11:14 a. m. Full speed ahead. Engine 220 r. p. m.
11:33 a. m. Bell Buoy.
11:49 a. m. Alki Point.
12:55 p. m. Pully Point.
1:01 p. m. Turned around.
1:06 p. m. On course.
1:12 p. m. Pully Point N. N. W.
2:12 p. m. Alki Point N. N. W.
2:25 p. m. Changed course.
2:40 p. m. Alki Point.
2:54 a. m. Bell Buoy N. E.
3:00 p. m. Changed course.
3:10 p. m. Stopped engines.
3:28 p. m. Fast at shipyard.

Alki Point to Pully Point 8 nautical miles.

Trip south bound 1 hour 6 minutes against tide and wind.

Trip north bound 1 hour. Slack water.

Average speed of ship 8 knots per hour.

# MOTORSHIP

A journal devoted exclusively to Commercial Motor Vessels and their operation. Issued on the 25th of each month.

1321 L. C. Smith Building, Seattle, Wash.

MILLER FREEMAN ........................ Publisher
RUSSELL PALMER ........................ Manager

Eastern Office, South Ferry Bldg., New York City.
San Francisco Office, 88 First Street,

United States and Mexico, per year ............ $3.00
Canada and Foreign Countries in Postal Union ... 3.50
Single Copies ............................... .25

All changes and new copy for advertisements must be furnished prior to the 5th of each month.

Entered as second-class matter at Seattle, U. S. A.

Notice of discontinuance of advertising must be given before the 1st of the month preceding issuance.


## WHAT AMERICA'S OIL OFFERS TO SHIPOWNERS!

IT IS reasonably safe to assume that Federal operation of the country's fleet of new and commandeered ships will practically terminate soon after the war is over and that most of the new vessels will be chartered or sold to private domestic shipping companies; otherwise the many foreign trade enterprises indirectly related to private ship-owning business may gradually become defunct or pass into the control of foreigners. For, there are hundreds of business enterprises abroad that have been built up by trading companies associated with shipping lines, or in co-operation with shipowners. Without constant building-up of new trade ventures in South America and elsewhere, also the maintenance of existing overseas developments, it is reasonable to say that dozens of our fine ships would eventually spend more time in harbors awaiting cargoes than at sea, under which conditions America's maritime supremacy would be but a dream.

Ships are of no use without cargoes and passengers, and, to provide these cargoes and traffic, American capital and American enterprise must build up vast businesses abroad and American business-men must operate the ships to carry the trade thus formed. We refer, of course, to the more normal conditions that will follow the present abnormal situation. The present Government intervention in shipping doubtless will ultimately prove the best thing for the country; but should only be regarded as a war measure and not a permanent institution. Federal shipbuilding probably will continue much longer than Federal ship operations, which is logical.

In the past our shipowners do not seem to have fully absorbed the extraordinary advantages to be derived from America's wonderful resources of oil, if utilized in the most efficient manner, although they now appear to be beginning to more generally realize that steam-power in any form for propulsion of ships will not enable them to utilize this advantage to anything like its full extent, and that the Diesel engine is three to four times as efficient as oil-fired steam and four to five times as efficient as coal-fired steam. Also, that if the domestic-built engine is not as perfect as claimed by manufacturers, financial assistance must be made available by shipowners and by oil companies to make it perfect. Even if this cost several million dollars it would be a profitable business investment. America must not heed any expense until the Diesel engine far exceeds marine steam-power in reliability under the most strenuous conditions of maritime service. America has the money and should have the finest and most economical type of ocean cargo-carrier it is possible to build.

The unwilling ones have offered the plea that American engineers cannot successfully build Diesel engines. But, if we really set our heart upon it, American engineers can do just as well as foreign engineers, if not better, as we have done in other branches of engineering such as locomotives, bridge-construction, battleship-building, reservoir building, etc. Furthermore, we have the advantage of the earlier experiences with the motorships of foreigners and thus should know just what mistakes of design and construction to avoid. If we cannot do what European shipbuilders are doing in the way of successful motorship construction then we had better drop entirely the idea of merchant marine supremacy, which, of course, is an unthinkable attitude for all true spirited American shipowners.

Up to now steam principally has been adopted in the face of motorship progress abroad, owing to shipbuilders and engineers throughout the country being familiar with the construction of the machinery of this class of vessel and because American marine engineers are more familiar with the operation of steam machinery than with any other system of propelling power, including that of the Diesel-type internal-combustion-oil-motor.

Also shipbuilders have been unwilling to go to the expense of changing their construction facilities, because shipowners have been unwilling to co-operate to the extent of sharing the responsibility of the first motorships. Shipowners and oil companies must give this co-operation.

Granted to an extent we can at the moment build steamships quicker than we can build motorships. Once reasonable headway has been made with the construction of motorships they could be turned out just as rapidly and even quicker than steamers, for the oil-engine lends itself better to standardization than do steam-engines and boilers.

The United States, including Mexico, is the world's greatest oil producing country; while Great Britain leads in the production of the class of coal best suited for steamships, and she controls the marine coaling stations of the Seven Seas, and many other countries depend upon her for coal for their ships. Thus it is logical that if we desire maritime supremacy we absolutely must develop and build a type of merchant ship that will be totally independent of Great Britain's coaling and oil-fuel stations, most of which have been established by private shipping enterprise. Our own ships, too, must be independent of our own fuel-oil stations abroad, if such are established later on. That is to say our ships must carry sufficient fuel-oil to go around the world and "then some"; but, without interfering with their cargo-carrying capacity.

On this basis American ships must be propelled by a class of engine that will use oil-fuel in the most economical manner possible, that they may cruise from port to port around the globe without having to refuel in any foreign port. This means that we must build Diesel-type oil-engines in our shipyards and marine engineering shops, instead of coal-fired or oil-fired steam-engines; because this type of marine engine is one-third to one-fourth as economical as oil-fired steam machinery and one-fourth to one-fifth as economical as coal-fired steam machinery. Hence motorships can travel 20,000 to 25,000 miles without refuelling and still carry 8 to 10 per cent. more cargo than steamers on given dimensions in addition to having lower operating expenses and also dispensing with that bugbear of all shipowners, stokers.

Look what an enormous advantage this means to the "tramp" class of steamship! Much of the British enormous pre-war over-seas trade was due to the tramp class of ship, which could not have been unless assisted by Great Britain's world-wide coaling depots. American motorships carrying their own fuel supply in the double bottoms will "beat the British tramp to it" at their own game. In the evidence given a little more than a year ago before the Federal Commission on Merchant Shipping and Fisheries it was conclusively proved that an American built and owned Diesel-driven motorship could be operated much cheaper than a British coal-fired steamer when in direct competition with the said steamer.

At present Great Britain is not a competitor with the United States in the carrying of freight on the ocean, because there is more freight than vessels to carry it; so America's policy now resolves itself mainly into a matter of "ships." When Great Britain had her great merchant fleet intact freight rates were low, and so they will be again as soon as Great Britain has sufficient ships to compete once more with the world.

American-owned oil and coal fired steamers probably will not be able to succcessfully compete against foreign owned steam vessels; but American motorships will be able to do so. Our ship's engineers, firemen and sailors lately have had a good taste of high wages and big bonuses and never will return to the pre-war wages, so the operation of steamers will be higher than they originally were, if not nearly as high as they are now, partly owing to the greater demand for men caused by the increased number of ships. With low freight rates this will be a serious situation for shipowners to handle. In the case of motorships the absence of stokers will offset this wage difficulty and other economies will be so enormous that it hardly will be noticed.

There is another side of competition to be anticipated by our shipowners and met in the true American spirit. Great Britain is our ally, and without doubt always will remain so. But for over three years she has been pouring her gold into this country and into the coffers of other allies who in turn have transferred it to us, making us the wealthiest country financially in the world.

It is up to her financiers, shipowners and overseas traders to make friendly, but nevertheless strenuous, efforts to secure this gold back by dint of fair and energetic trading after the war—Great Britain's very existence demands it! Thus when peace reigns she will be forced into a great trade competition with us, and of course, she will be wonderfully equipped because of the extraordinary developments in her productive powers. Even now some of her great shipowners are building big Diesel motorships in anticipation or preparation thereof.

Relieved of her warship construction, warship repairs and munition work, she undoubtedly will strive her utmost to build merchant ships in large numbers. Probably her Government will make large subsidies to shipowners for this purpose. She will have the advantage of her world-wide coaling-stations. Her ships will continue to be operated at much lower cost than American steamships, and also she will go in largely for motorships, many of her shipowners having already made such arrangements as just mentioned. Thus will her ships carry freight at rates low enough to put many of our steamships almost out of business. There will be no need then for our Government to fix a maximum freight rate!

Therefore, it is imperative that American shipowners rely upon oil as fuel for her ocean-going ships, and, as American oil-fired steamships cannot be operated as cheaply as foreign coal-fired steamships, we must develop and use the Diesel-type oil-engine to the fullest extent, and then our merchant marine will be able to compete advantageously with any class of ship that others can build—even with British motorships, owing to the advantage of obtaining low-priced fuel-oil being with us. Oil is our future watchword, and if oil be properly and efficiently utilized it will bring us merchant maritime supremacy. Otherwise all our great efforts may fail to bring the anticipated results.

## ANOTHER RUSSIAN DIESEL BUILDER.

A Sulzer-Diesel engine constructional license has been granted to the Soromowo Works, Soromowo, near Moscow, Russia, who have actively taken up the construction of these motors. The Kolomna Works, Golutwin, near Moscow, also has acquired a Sulzer license. For about 10 years the Kolomna Works have been building marine and stationary type Diesel engines from their own design; but evidently considered the Sulzer design so great an advance over their own that the change was warranted.

## LARGE SURFACE IGNITION ENGINES ORDERED.

The Skandia Pacific Oil Engine Co, of San Francisco, has just received an order for four 500 b. h. p. Skandia engines from Singapore. These will be six cylinder units having a bore of 42 cent. and stroke of 46 cent. It will be observed that the cylinder diameter is the same size as the famous German shell. No other American concern has yet turned out a hot bulb engine of this size.

## A CORRECTION.

In our article on Fuel Oil and Oil Injection Engines in our October issue we printed a Surface Tension Temperature Curve incorrectly. We are, therefore, printing a corrected Surface Tension Temperature Curve for a Fuel Oil for Oil Injection Engines, showing the Surface Tension in Dynes per centimeter and pounds per linear inch. (Plate 3, of corrected Version Bulletin Number 7.) It is recommended that subscribers keeping file copies for reference clip this table and paste it over the one printed in the last issue.